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EIGHT FIGURES,

TWENTY-FIVE CENTS.

AMERICAN MANUAL

OF THE

GRAPE VINES

AND THE

ART OF MAKING WINE:

INCLUDING

An Account of 62 Species of Vines, with nearly 300 varieties. An account of the principal Wines, American and Foreign. Properties and uses of Wines and Grapes. Cultivation of Vines in America; and the Art to make good Wines.

WITH 8 FIGURES.

BY C. S. RAFINESQUE, A. M. PH. D.

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Let every Farmer drink his own Wine.

PHILADELPHIA:

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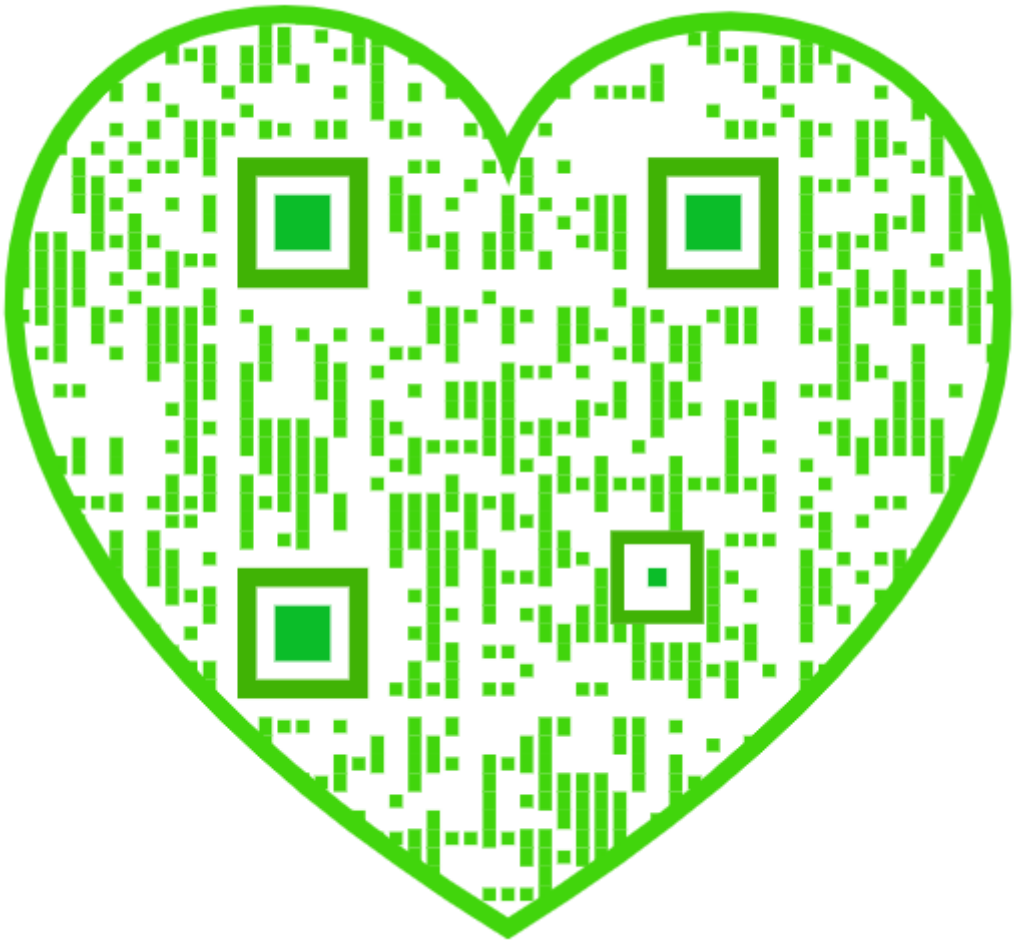

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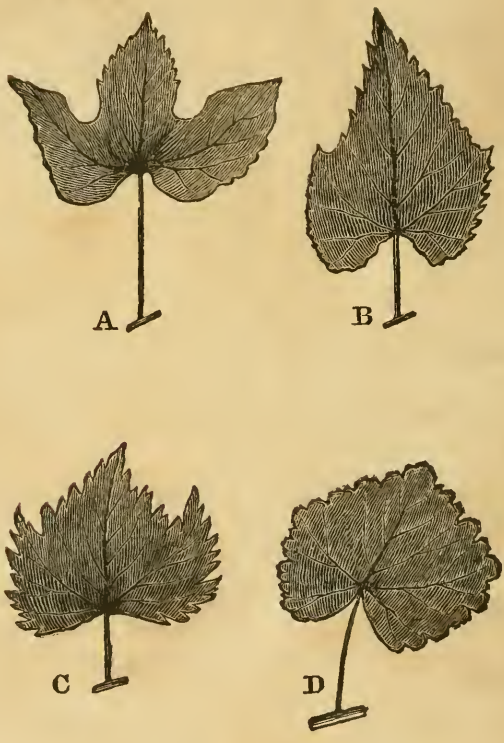

Fig. I. or A. VITIS SAXATILIS, *Sp.* 3.
Var. Longipes.

Fig. II. or B. VITIS LONGIFOLIA, *Sp.* 21.

Fig. III. or C. VITIS ACERIFOLIA, *Sp.* 23.

Fig. IV. or D. VITIS ANGULATA, *Sp* 32.

Fig. V. or E. VITIS CILIATA, *Sp.* 20.
Fig. VI. or F. VITIS PROLIFERA, *Sp.* 40.
Var. Isabella.
Fig. VII. or G. VITIS MULTILOBA, *Sp.* 4.
Fig. VIII. or H. VITIS BLANDA, *Sp.* 19.

AMERICAN MANUAL

OF THE

GRAPE VINES.

Botanical name VITIS.
French name VIGNE, the grape *Raisin.*
German name REBE, the grape *Traube.*
Italian name VITE, the grape *Uva.*

Genus Vitis. Perfectly trioical. Calyx cuplike, 5 lobed before the flowers expand, entire afterwards. Corolla of five petals oblong obtuse hooded, adhering at the summit. Five long stamina opposed to the petals. Pistil on a glandular disk, a stigma subsessile, capitate entire. Berry one celled, 2 to 5 seeds obcordate. *Woody vines with alternate petiolate and stipulate leaves; tendrils and thyrsoidal racemes of flowers and fruits, opposite to the leaves.*

HISTORY. I propose to give here a monography of the North American Grape Vines. The subject is new and obscure. The botanical species are scarcely indicated, and their numberless varieties have been overlooked by our best writers. I have ascertained about 40 species and 100 varieties, but I must confess that it is not always easy to say whether one or the other. I was once inclined to consider all our Grapes (like our Strawberries) as varieties of a single species, the *Vitis vinifera* of the old Continent, and it must be so, unless that kind is also divided into others, such as *V. labrusca*, *V. laciniosa*, *V. aurea*, *V. farinosa*, *V. atra*, *V. corinthiaca*, &c. to distinguish the wild, cut-leaved, mealy, black, and Currant Vines of Europe. While all these have been united to *V. vinifera*, our native Grapes had been made into 8 or 10 species, which differ less than those, and can hardly be distinguished from them, in an exclusive point of view, except by their more permanent polygamy. My attempt to classify our Vines is therefore arduous, many species being described by authors under the same name; but I hope will be

useful in making them known, and may lead to a better one when all may be examined on my plan. Many varieties have no doubt escaped my researches, they abound in the woods, since the seeds do not always re-produce the identic kind, and Major Adlum has stated to me to have seen 200 varieties at least: some, however, differ but slightly; my enumeration is ample enough to include all the principal kinds. My distinguishing characters will be taken from all the parts, branches, petioles, leaves, flowers, and fruits. I will thus offer what has hardly been done yet for the Grapes of Europe, Asia, and Africa; it will be the result of my observations during many years and many thousand miles of travels. Our vines being all wild (except a few transplanted in gardens) exhibit the spontaneous operation of nature and hybridity in this fine and valuable genus.

The following are the genera akin to *Vitis*, and belonging to the same natural order of Sarmentacea, distinguished by *Stamens equal in number to the petals; opposed to them and inserted on a hypogynous disk: one pistil and stigma. fruit a berry.*

1. G. *Cissus.* L. Calyx entire. Petals 4, not coherent. Stamens 4, disk cup-like. Berry one seeded. *Many tropical species.*

2. G. *Ampelopsis.* Mx. Calyx 5 toothed. Petals 5, not coherent nor hooded. Stamens 5. Disk cup-like lobed. Short style. Berry 2 locular, 2 or 4 seeded. *A. bipinnata*, (*V. arborea*, L.) and *A. cordifolia* of North America.

3. G. *Quinaria.* Raf. Calyx 4 or 5 lobed. Petals 4 or 5 hooded, not coherent. Stamens 4 or 5. Disk as in Vitis. A style. Berry 4 locular, 4 seeded. *Q. hederacea*, (or *Ampelopsis quinquefolia*) and *Q. hirsuta* of North America.

4. G. *Causonis.* Raf. Calyx 4 toothed. Petals 4, hooded, not coherent. Disk 4 lobed, with 4 sterile filaments alternate with the lobes. Stamens 4. Style filiform. Berry one seeded. The *V. trifolia* and *V. japonica* belong here.

The *V. heterophylla* of Thunberg does not even belong to this order, but to the same as *Hedera* or Ivy. I call it G. *Allosampela.* Calyx superior persistent, with 5 ob-

tuse teeth. Petals 5, oval concave hooded. Disk 5 furrowed. Stamens 5, inserted in the furrows. Pistil inferior adherent, style filiform. Berry pisiform crowned, 2 locular, 2 or 4 seeds obcordate.

Several species of *Vitis* are of doubtful genus, the flowers not having been noticed, such as *V. pinnata*, Vahl. *V. pentaphylla*, Th. (perhaps a *Quinaria*) *V. capensis* and *V. cirrhosa* of Thunberg, *V. lucida* of Australasia, &c.

Of the true species of *Vitis*, the greatest number are native of North America. The *V. indica* (under whose name many species or varieties are also blended) and *V. heptaphylla* are from tropical climates; while the *V. vinifera* or common Wine Grape, with its numerous varieties, are found in temperate climates, from China to Spain and Barbary. Several other species hardly known are found in Africa and Asia. After enumerating our American vines, I shall briefly notice these other Grapes, since all are interesting as useful, viniferous and economical.

For the sake of perspicuity, this subject shall be divided into 5 parts or sections. 1. Account of our vines. 2. Account of foreign vines. 3. Properties and use of vines and grapes. 4. Cultivation of vines in America. 5. Principles of the art to make good wine.

Section 1. *North American Grape Vines.*

The number is so great that some arrangement is needful; I have long sought for the most constant distinguishing marks, and have at last decided to use those afforded by the shape of the fruit and under surface of the leaves as most striking and least variable; but I am by no means confident that they are the best. I have thus 3 series of vines with globular berries. 1. With leaves tomentose arachnoidal and colored beneath. 2. Leaves pubescent beneath. 3. Leaves perfectly smooth beneath, and a 4th series with fruit not globular. All our American vines agree in being humble trailing vines in their youth, but susceptible to live from 100 to 300 years, and to become very large, as tall as the tallest trees that support them: the bark is fibrous, the wood hard, branches knotty, leaves very variable, but always more

or less cordate or reniform at the base, and toothed on the margin, with five branched nerves and deciduous stipules. Flowers in bunches, thyrsoidal or paniculate, small, more or less fragrant, greenish yellow, complete or pistiliferous or staminiferous, on 3 different individuals, blossoming in May and June. Fruit from the size of a pea to that of a plumb.

I. Series. *Frondarania.* Raf. Berries globular or depressed. Leaves tomentose beneath, tomentum arachnoidal colored, yellow, fulvous, rufous, rusty, white, cinerous or glaucous.

1. Sp. *Vitis fulva*, Raf. (*V. estivalis* of many botanists, not of Mx. nor Elliot.) Yellow Grape. Branches tomentose. Petioles shorter. Leaves broad cordate, 3 or 5 lobed, unequally dentate, sinusses rounded, yellow or fulvous beneath. Racemes oblong. Berries round and small. It grows from Canada to Virginia, on rocky river banks. The leaves become smoother when old; the fruits are commonly of a deep bluish purple, and are ripe in August. The varieties are: 1. *Sinuata*, leaves sinuate palmate, coarsely toothed. 2. *Quinqueloba*, all the leaves with 5 lobes. 3. *Corallina*, leaves yellow beneath, fruit larger, of a fine red color and delicious taste. In Virginia, perhaps a peculiar species, called Red Grape and Coral Grape.

2. *V. ursina*, Raf. Raccoon Grape. Branches striated, fulvous tomentose. Petioles shorter fulvous tomentose. Leaves reniform 5 lobed, base reniform, sinusses rounded, lobes oval acuminate, with a few large teeth, pubescent above, rusty gray beneath, nerves fulvous. From Ohio to Louisiana and Texas, near streams, called Bear and Raccoon Grape, because greedily eaten by these animals. Grapes of middle size, commonly purplish, ripe in September and October. Young leaves rusty beneath. Var. 1. *Cerulea*, berries dark blue. 2. *Prolifera.* 3. *Repens.* 4. *Alba.* 5. *Heterophylla.* 6. *Triloba.*

3. *V. saxatilis*, Raf. Stony Grape. See figure I. or A. for variety *longipes.* Branches flexuose nearly smooth. Petioles villose variable. Leaves variable cordate, often trilobed, lobes divaricate ovate acuminate, with distant acute teeth, sinusses rounded, rugose and pilose above, gray beneath. Among stones in Arkansas and Texas.

Many varieties : 1. *Longipes*, branches fulvous hairy. Petioles very long, rusty. Leaves trilobe, base reniform. 2. *Media.* Petioles shorter. Leaves ovate 3-5 lobed, base acute cordate. 3. *Blandina.* Petioles long. Leaves cordate trifid, base acute cordate, lobes near or even overlaping, as in *V. blanda.* Perhaps several species, but leaves often variable on same vine. Grapes good.

4. *V. multiloba.* Raf. Dissected vine. See figure VII. or G. Branches tomentose rusty. Petioles very short, round, tomentose rusty. Leaves palmate multilobe, base oval acute, sinusses oboval rounded, segments bilobe, the middle ones trilobe, lobes oval lanceolate acute, with but few acute teeth, pubescent above, rusty glaucous beneath, nerves rusty. Found on the Washita and Red River, cultivated at Bartram's garden. Grape large, good and sweet. Var. 1. *Rubripes.* Petioles red. Leaves smaller, 5 lobed, lobes oval entire acuminate, without lobes, rusty gray beneath, nerves concolor. Is it a peculiar species ?

5. *V. digitata.* Raf. Hand-chick Grape. Petioles equal rufous. Leaves palmate 5 lobed, base reniform, sinusses very broad, lobes lanceolate unequal toothed, white beneath, nerves rufous stellate hairy. Berries black and small. In Virginia, Carolina, &c. Grapes similar to the Chicken Grapes.

6. *V. bracteata*, Raf. (*V. labrusca*, Walter, *V. estivalis*, Elliot.) Sour Grape. Branches and petioles tomentose. Leaves broad cordate, rounded, entire or lobed, toothed, white beneath. Panicles of several bracteated fascicles, 3-6 flore. Berries black and pisiform. In the Southern States, from Carolina to Florida. A very tall vine, with small fruit like a pea, black, very acid and austere.

7. *V. callosa.* Raf. Canada vine. Branches and petioles striated pubescent. Petioles subequal. Leaves reniform subtrilobe acute, with minute callous denticles, lucid above, white beneath, nerves rufous. Raceme compound. From Canada to Pennsylvania, in hills. Young leaves pubescent above, smooth when grown. Blossoms in June. Fruit unknown.

8. *V. hyemalis.* Raf. Winter Grape. Branches grooved smooth. Petioles smooth, very short. Leaves cordate

subtrifid acute, with unequal obtuse teeth, smooth above, pale gray beneath. Racemes small. Berries globular, purplish black and small. From Canada to Ohio and Virginia, large vine, blossoms in July, fruits only ripe after frost, in small bunches, rather dense, of an acid bad taste.

9. *V. serotina.* Raf. Late Grape. Branches procumbent pilose, sometimes rooting. Petioles subequal pubescent. Leaves cordate palmate, 5 lobed, hardly crenate, sinusses rounded, lobes rounded acuminate, hairy above, gray beneath. Berries small and black. From Ohio to Missouri and Kentucky, in glades, near streams. Grape austere, ripe in October. Var. 1. *Repens.* 2. *Micracina.* 3. *Sanguinaria.* Bloody grape of Missouri. Berries sweet, black outside, red inside.

10. *V. glareosa.* Raf. Trailing Grape. Branches procumbent, trailing, elongated and smooth. Petioles subequal smooth. Leaves remote, cordate sagittate, broad, subtrifid, serrate, smooth above, white beneath. Berries bluish black, large and sweet. This is the summer grape of the western glades or barrens, found from Illinois to Florida. Never climbing, fruit very sweet and fine, as large as cherries, ripe in August.

11. *V. latifolia,* Raf. (*V. taurina,* Walt. *V. labrusca* of many botanists, but very different from *V. labrusca* of Europe.) Fox Grape. Branches slender striated pubescent. Petioles short hairy. Leaves ample coriaceous, cordate oval, lobes approximated at the base, trifid angular, denticulate, wrinkled and smooth above, white beneath, nerves yellow. Racemes small. Berries large, depressed and hard. From Canada to Florida and Louisiana, called by many names, Fox Grape, Bullet Grape, Bull Grape, Frost Grape, Tough Grape. In woods and hedges, blossoms in June and July. Leaves ample, rusty beneath when young. Flowers green, peduncles hairy, a short style. Fruit commonly purple, with a hard skin and a tough pulp, taste foxy. Many varieties: 1. *Alba,* berries whitish. 2. *Nigra,* berries black, austere and harsh. 3. *Pruniformis,* as large as a plumb, of a deep purple, fleshy when ripe, called Elkton or Plumb Grape. 4. *Rubra,* smaller red grapes, called Red Fox Grape.

12. *V. labruscoides.* Mg. and Raf. Sweet Fox Grape. Branches round and smooth. Petioles subequal, hardly pubescent. Leaves reniform at the base, trifid or quinquefid, acute, with unequal acute callous teeth, sinusses acute, smooth above, glaucous beneath. Racemes small. Berries large, depressed, juicy and sweet. From New York to Virginia, in woods, &c. Large vine, fruit different from the last, musky rather than foxy, skin thick and austere, but inside when ripe with a sweet rich juice. Var. 1. *Serotina*, Frost Grape, purplish black. 2. *Rubra*, Worthington Grape, smaller berries, juice dark red, sweet and rough. 3. *Pulposa*, Luffborough Grape, berries very large, of a deep purple, pulp dissolving in a sweet musky juice. 4. *Precox*, Early Grape, middle size berries, black, with a white bloom, sweet musky taste, ripe in July in Virginia. 5. *Major*, Big Grape of the Catskill mountains. Berries purplish blue, exceedingly large (one measured by Mr. Eaton was 3 inches around) fine sweet pulpy juice. All highly deserving cultivation.

13. *V. rugosa.* Raf. Roughleaf Grape. Branches round and smooth. Petioles similar, subequal, compressed. Leaves cordate 5 lobed, coriaceous with rounded acute teeth, lobes acute, very wrinkled above, beneath glaucous. Racemes elongate compound. From New York to Ohio, blossoms in June. Fruit unknown.

14. *V. canina.* Raf. Dogs Grape. Branches round and smooth. Petiole striated pilose short. Leaves oval cordate, base subreniform acute, end subtrifid, middle lobe much longer deltoid very sharp, teeth small broad acute, smooth above, with hairy nerves, glaucous beneath, with rusty nerves. From Pennsylvania to Virginia, &c. Fruit large, purple, tough, with a bad foxy taste, hardly edible. Leaves quite ovate, much longer than broad, some large 8 inches long, 6 broad, petiole 4 inches.

15. *V. luteola.* Raf. Variable Grape. Branches slender flexuose, fulvous tomentose. Petioles short similar. Leaves cordate oval acute, base acute, sides hardly angular, nearly entire, denticulate by the mere jutting of nerves, smooth deep green above, yellow tomentose beneath. Grapes large, depressed, hard. In Pennsylvania, &c. Leaves small 4 inches long, 3 broad, petioles 2.

Fruit foxy, tough. Var. 1. Yellow. 2. White. 3. Purple. 4. Red Grapes.

16. *V. ferruginea.* Rusty Grape. Branches rusty tomentose, angular, angles obtuse. Petioles short, rusty tomentose. Leaves cordate trifid coriaceous, base sinus acute, lobes remote, teeth unequal mucronate, smooth above, rusty tomentose beneath. Fruit large, depressed, hard, foxy. In Pennsylvania. Leaves as broad as long, petioles half length, called Fox Grape as well as the last. Grapes commonly pale red, or white tinged of purple.

17. *V. bifida*, Raf. Bifid Grape. Branches smooth purple. Petioles subequal pubescent. Leaves ample coriaceous, cordate ovate trilobe acute, end mucronate, sinus of the base acute, lobes remote, lateral sinusses obtuse, teeth unequal large acute, smooth above, rusty gray beneath. Racemes bifid, grapes small bluish black, acid. From Pennsylvania to Kentucky, one of the Chicken Grapes. Leaves 6 inches long and broad.

18. *V. obliqua*, Raf. Sandhill Grape. Branches slender, hairy, angular, angles obtuse. Petioles very short, hairy. Leaves obliqual ovate cordate trifid acuminate, base cordate acute, lobes near, commonly unequal, teeth unequal, very small, rugose hairy above, glaucous tomentose beneath. Berries white, sweet and juicy. In the sandhills of Arkansas river and Oregon mountains. Leaves small, 3 inches long, 2 broad, petiole only one. Grapes said to be very good. Cultivated at Bartram's garden. Very different from Sand Grape, variety of *V. blanda*, and more like *V. longifolia*.

19. *V. blanda.* Raf. See figure VIII. or H. Bland Grape. Branches round and smooth. Petioles striated pilose subequal. Leaves nearly square, cordate or rather split at the base, sinus narrow acute, with lobes overleaping; trifid, sinusses small acute, segments acute, the terminal larger; teeth unequal obtusely mucronate; smooth above, glaucous and sparingly arachnoidal beneath, with rusty nerves. Racemes compound. Berries large and sweet. From Pennsylvania to Louisiana. One of the most commonly cultivated as best for eating and wine: the bunches are large, the berries as large as the common wine grape of Europe, commonly pale purple, with a

thin skin and white sweet musky juice. Many names given to it, Madeira Grape, although a true native, Mazzei Grape, Powell Grape, Clifton Grape, &c. The *raisins de Cote*, or Sand Grape of Louisiana, appear only a variety. The leaves are arachnoidal at first, but often become nearly smooth when old. Many var. 1. *Flava*, grapes of a yellow white. 2. *Viridis*. Green Bland. Fruit smaller, green when ripe, yet sweet and juicy, ripens early in July near Catskill mountains. 3. *Caroliniana*. Smaller grapes. 4. *Arenaria*. Sand Grape of Louisiana and Arkansas. Leaves nearly smooth, except nerves beneath, but similar in shape, grapes dark blue, very sweet, skin thicker. 5. *Heterotoba*. Oddleaf Grape. Leaves with unequal lobes at the base and top, base lobes approximated or overleaping, upper lobes larger unequal sharp, with large teeth. In Ohio. Perhaps some are peculiar species.

20. *V. ciliata*. Raf. See figure VI. or E. Elsinburg Grape. Petioles striated hairy subequal. Leaves ovate cordate 5 lobed, base with remote lobes, sinusses and lobes narrow acute, teeth large remote ciliolate, hairy above, dirty gray beneath, nerves fulvous gray. Berries blue, large, very sweet and juicy. Found in New Jersey. Begins to be cultivated, fruit as sweet as sugar, somewhat like the Bland Grape, but blue, and leaves totally different.

II. Series. *Lasipia*. Berries globular or depressed. Leaves more or less hairy beneath, or at least on the nerves, but neither arachnoidal nor tomentose.

21. *V. longifolia*. Raf. See figure II. or B. Petioles short and hairy. Leaves oblong cordate, sinus of the base rounded, hardly trifid, or with two longer teeth near the middle, end acuminate falcate, unequal sharp teeth, pubescent above, hairy and gray beneath. Berries blue and sweet. In Arkansas and Texas, bearing fine blue grapes, very sweet. Cultivated by Mr. Hulin, in Philadelphia. Leaves small, about 4 inches long, less than 3 broad, petiole 2 inches : branches slender, round and smooth : old leaves nearly smooth.

22. *V. dimidiata*. Raf. Orwisburg Grape. Branches slender striated smooth. Petioles subequal slender, striated and nearly smooth. Leaves thin, oval reniform tri-

fid, elongate acuminate, teeth large unequal acuminate, smooth above, glaucous beneath, sparingly pilose, chiefly on the nerves. Berries depressed and sweet. Found near Orwisburg, on the Schuylkill, in Pennsylvania, and cultivated in gardens. Leaves very thin, pretty large, about 5 inches long and 4 broad. Grapes very good. 3 Varieties, white, purple, and black. This species appears to answer completely to the description of the *V. riparia* of Poiret, (not of the others) which was the *Vigne des Battures* of Louisiana, and thus this fine grape is from Pennsylvania to Louisiana. Nerves marginal at the base.

23. *V. acerifolia.* Raf. See figure III. or C. Mapleleaf Grape. Trailing. Petioles very short, striated, pilose, redish. Leaves reniform trifid, base dilatate, nerves not marginal : sinusses acute, segments acuminate falcate, teeth very large, unequal and sharp, smooth and pale or glaucescent on both sides, nerves pubescent above and beneath, margin also pubescent. Brought from the Oregon mountains by the expedition of Long, cultivated in Bartram's garden. It has not given fruits as yet, but they are said to be very good and juicy. Leaves very much like those of many Maples, 4 to 6 inches long and broad, a little variable, more or less gashed, sometimes sinusses very narrow, that of the base sometimes round.

24. *V. montana*, Raf. Mountain Grape. Branches decumbent, round and smooth. Petioles round and smooth, longer than the leaves. Leaves cordate trifid acute, membranaceous, unequally serrate, smooth and lucid above, pubescent and pale beneath. Berries small and black. In the Alleghany mountains from New York to Carolina. A small trailing vine, near to *V. Odoratisima*, but leaves larger, petioles longer, flowers hardly odorous, fruit hardly good.

25. *V. concolor*, Raf. Dwarf Grape. Branches procumbent green, round and smooth. Petioles round, smooth, exceedingly short, one fourth only. Leaves very thin, ovate acute subangular, base reniform, margin subangular, with unequal mucronate teeth, both sides green, lucid sparingly pilose. Small vine trailing on the ground, from New York to Missouri. Petioles only one fourth of the length of the leaves. Grapes small, blackish, called Ground Grape and Chicken Grape : this last name is

given to all the small black Grapes, as Fox Grape to all the large and tough indifferently.

26. *V. columbina*, Raf. Pidgeon Grape. Branches round, smooth. Petioles round, subequal nearly smooth. Leaves palmate 5 lobed, base subreniform, lobes bilobe, terminal trilobe, lobules unequally ovate angular acute, sinusses rounded notched, teeth remote callose : upper surface smooth, beneath nerves pubescent and rusty. Racemes slender. Large vine, growing from New York to Louisiana, in woods, somewhat similar to *V. multiloba* in the shape of the leaves, but berries small, blackish, sweetish, eaten by the wild pidgeons like many others.

27. *V. populifolia*, Raf. Poplar Grape. Branches slender, green, smooth and striated. Petioles short, half in length, slender striated, pilose above. Leaves ovate deltoid, acuminate, base truncate or reniform, end hardly trifid, acutely serrate, smooth on both sides, nerves pilose above and beneath, pale beneath. Fruit small and black. Pennsylvania and Alleghany mountains. Leaves 4 inches long, 3 broad, petioles 2. Fruit very small, bitterish, bad tasted.

28. *V. cordifolia*, Mx. P. N. (*V. vulpina*, Torrey and Eaton.) Frost Grape. Branches round and smooth. Petioles slender subequal pilose. Leaves cordate acuminate, sometimes angular, unequally serrate, smooth on both sides, nerves pilose. Racemes loose multiflore. Berries small, pale, acid. In woods and near streams from New York to Carolina. Leaves three to four inches broad. This is one of the Fox Grapes of the Northern States, but very different from the *V. latifolia*, *V. labruscoides*, and the Southern Muscadine Fox Grapes. It is the Winter or Frost Grape of the Southern States : they are small, acid, of a pale or amber color.

29. *V. riparia* of Pursh, Elliot, Torrey, &c. River Grape. Branches smooth striated. Petioles striated pilose subequal. Leaves small reniform trifid acuminate, with large unequal acute teeth, smooth above, hardly glaucous beneath, with nerves and margin pilose. Racemes compound. Berries small. On the banks of streams from New York to Carolina. Flowers very sweet scented ; the sterile plant is cultivated under the name of Bermuda vine and Mignonette vine, for the profusion of

the blossoms smelling like *Reseda odoråta*. Var. 1. *Viridis*, berries greenish. 2. *Purpurea*, berries purplish.

III. Series. *Hypoleia*. Berries globular or depressed. Leaves smooth beneath, but commonly pubescent at the axilla of the nerves.

30. Sp. *V. odoratissima*, Donn. Sweet scented Grape. Branches and petioles smooth, not striated. Petioles short, half the length. Leaves small reniform trifid, subacuminate, subangular, unequally incisile toothed, smooth and green on both sides, axillas of nerves bearded beneath. Racemes pubescent, lax, compound. Berries pisiform and sweet. From New York to Kentucky, in groves, fields, commonly procumbent, not twining: blossoms in May, flowers very sweet, like *V. riparia*, from which it differs by the petioles, leaves nearly angular laciniate, not pubescent nor ciliated. Many authors have united it to *V. riparia*. Var. 1. *Atropurpurea*, grapes purplish black acerb, on the Ohio and Green Rivers. 2. *Purpurea*, grapes purple and sweet, in Ohio. 3. *Nigra*. Petioles equal to leaves, grapes black, fine flavor, in Ohio. 4. *Alba*. Grapes white, in New York.

31. *V. Amara*, Raf. Bitter Grape. Branches striated and smooth. Petioles very short, smooth, purplish. Leaves cordate acuminate, base obtuse, lobes distant, unequally toothed, teeth rounded mucronate, smooth on both sides, pale beneath, nerves brown, with bearded axillas. Berries small, black and bitter. Found near Philadelphia by Mr. Carr, and cultivated in Bartram's garden. Leaves about 6 inches long, 6 broad, petioles 2. Berries pisiform, intolerable bitter, with two seeds and hardly any pulp.

32. *V. vulpina* or *muscadina*, Raf. (*V. incisa*, Jaq. *V. vulpina*, L., Abbot, Walter, Smith. *V. rotundifolia*, Mx. P. N. Elliot.) Muscadine Grape. Branches pubescent. Petioles subequal smooth. Leaves cordate acute, unequally toothed, smooth and shining on both sides, nerves bearded at the axilla. Racemes with many capitules. Fruit depressed, large, juicy. From Virginia to Florida and Texas, near streams chiefly. It bears a multitude of vulgar names, such as Muscadine, Bullet, Fox and Scupernong Grape: the confusion in the botanical names is as bad, and as they do not apply, I have changed them

all. As I have not seen this species, I have chiefly relied on Elliot's description. The leaves are 2 or 3 inches long and broad. It blossoms in July and August: 6 to 8 flowers to the branches of the racemes. The fruit is large, 7 to 9 lines in diameter, oblate spheroidal or flattened, with a thick skin, purplish or bluish black; taste pleasant, sweet and musky, makes a very good wine.

33. *V. angulata*, Raf. See tab. 99, fig. D. Angular Grape. Branches cespitose, stiff, angular and striated, smooth and purple. Petioles subequal slender subpilose. Leaves small cordate rounded obtuse, with a few large lobular obtuse teeth, base acute, lobes divaricate, shining on both sides, axilla of the nerves bearded, margin subpilose. Fruit black, sweet and juicy. From Carolina to Arkansas and Texas, in glades, forming a bush, seldom climbing. Cultivated at Bartram's garden. Many vulgar names, Arkansas, Bushy, Currant, and False Scupernong Grape. Leaves hardly bigger than a dollar, sometimes purplish beneath: the young ones sparingly pilose on the nerves beneath, as in the series *Lasipia*. Old leaves nearly smooth, angles of the stem acute, fruit small, good.

34. *V. verrucosa*, Raf. Warty Grape. Branches round, stiff, smooth, warty or dotted. Petioles short, smooth. Leaves broad reniform acute, with large acute teeth, base subtruncate reniform, both sides lucid and smooth. Berries large, sweet, and juicy. From Carolina to Arkansas. This is another of the Scupernong Grapes; this name is given in Carolina to all the good juicy grapes. Leaves 2 inches broad, 1½ long, petioles 1 inch. The fruit is white, sweet and good.

35. *V. peltata*, Raf. or *V. floridana*. Florida Grape. Petioles short and smooth. Leaves drooping, ovate cordate acute, base subpeltate, split acutely, lobes approximated, large acute teeth all around, smooth and green on both sides, beneath nerves reticulated prominent with bearded axillas. A very singular species, lately found in Florida, and communicated to me by Mr. Halsey. The leaf is very small, 1½ inch long, one broad, petioles half of the leaf: a prominent net work beneath, formed by

prominent nerves instead of veins, as usual. Fruit unknown.

36. *V. integrifolia*, Raf. flor. Louis, 1817. Orbicular Grape. Leaves orbicular, entire, base hardly cordate, no teeth nor lobes. A doubtful species, inserted on the authority of Robin, but hardly described by him. From Louisiana.

37. *V. poiretia*, Raf. (*V. vulpina*, Poiret.) Chicken Grape. Leaves ample cordate, entire trilobe or 5 lobed, lobes distant at the base, lobes angular acuminate, unequally toothed. Both sides smooth, pale beneath, with yellow veins. Racemes with many ombellules, with a linear lanceolate bract. Berries small and black. This species, which Poiret describes as the *V. vulpina* of L. is totally different from it, and I strongly suspect only a variety of my *V. bracteata*, improperly described as smooth beneath

38. *V. palmata*, Vahl. Palmate Grape. Branches smooth purple. Leaves palmate cordate, segments lanceolate acute, lateral ones with lanceolate teeth, the terminal serrate. Raceme oblong and short. Only described and seen by Vahl, grown in Europe from seeds sent from America. Perhaps a variety of my *V. multiloba*. Stipules lanceolate. Raceme only one inch long.

IV. Series. *Aglobutia*. Berries not globular nor depressed, but oblong or oval, as commonly in *V. vinifera*.

39. *V. Virginiana*. Poiret. Virginia Grape. Branches smooth and red. Leaves coriaceous, ovate cordate 5 lobed, lobes unequal rounded, terminal large acuminate, teeth unequal short acute, above lucid, beneath with pubescent nerves. Berries oval. Described by Poiret from garden specimens, sent by Mr. Hingston from the Potomac. Racemes nearly simple, pedicels slender. Berry of middle size, of an oval round shape.

40. *V. prolifera*. Raf. (See tab. 100, fig. F.) Prolific Grape. Branches substriated, subpilose. Petiole short, pilose. Leaves cordate acute, of a square form, trifid, trilobe or 5 lobed, base acute with distant rounded lobes, upper lobes and sinusses variable, margin acute serrate above smooth, beneath cinerous tomentose, nerves fulvous. Racemes compound proliferous. Berries large el-

liptical. A very interesting and valuable species, with many varieties, and a multitude of vulgar names, such as *Alexander*, *Tusker*, *Schuylkill*, *Madeira*, *Muscadel*, *Clifton*, *Legoux*, *Cape*, *Isabella*, *Catawba*, *Tokay*, *Muncy* Grapes, &c. all belonging to one kind, although forming several varieties. They are real native grapes, found from Pennsylvania to Carolina and Ohio, in woods. The grapes are plentiful, large, fine, with a tough skin and a rich sweet juice. Already much cultivated and valued for eating and wine. The chief varieties are : 1. *Vulgaris*. Alexander Grape. Petioles longer, leaves larger, variable on the same vine, often lobed, with broad ovate acute lobes and narrow obtuse sinusses. Fruit blackish, as large as the end of a finger. 2. *Isabella*. Isabella Grape, figured here. Leaves commonly trifid, fruit large and purple : found in North Carolina. 3. *Media*. Clifton Grape. Smaller grape than the first, and not so sweet. 4. *Catabiana*. Catawba Grape, from North Carolina. Leaves large, commonly trilobe, grapes purple, lilac or white, according to shade and exposure, flavour musky. 5. *Prunoides*. Muncy Grape. Similar to the Catawba, but taste different, similar to that of Wild Plumbs. 6. *Ohiensis*. Ohio Grape. Grape smaller, white.

41. *V. obovata*, Raf. Oboval Grape. Leaves similar to the *V. prolifera*, on long petioles, commonly cordate, trilobe acute, sinusses acute. Berries large oboval. From Pennsylvania to Virginia, in islands and banks of streams and rivers. Perhaps variation of the last ; but it has itself many varieties. 1. *Rupestris*. Large vine, with loose branches, grapes purple, very juicy and sweet. 2. *Nigra*. Grapes loose, few, obovate, nearly black, very sweet. At the head of the Susquehannah. 3. *Pallida*. Grapes pale red, Alleghany River. 4. *Prunoides*. Bluish large grape, like a Plumb.

N. B. By the above enumeration of our Grapes, I have done for this genus what Michaux did for our Oaks. Owing to the great confusion of former authors, and the difficulty of comparing the leaves and fruits of all the species, it is hardly as perfect as I should wish. Rigid botanists may perhaps wish to reduce these species to a minor number, or consider some as hybrids : if they can find good permanent collective characters, let them re-

duce our Grapes and Oaks to a dozen species. But the angular or striated branches, the long or short petioles, the oval, cordate or reniform leaves, &c. must always be deemed essential specific characters, and several of my new species, such as *V. bracteata*, *V. angulata*, *V. peltata*, *V. canina*, *V. blanda*, *V. longifolia*, *V. acerifolia*, *V. amara*, *V. prolifera*, &c. must be deemed very distinct. It remains for me to apply the same principle to the Vines of the old continent, which I shall do in a very concise manner, and merely as an illustration of the American kinds.

II. *Section. Account of Exotic Grape Vines.*

42. *V. vinifera*, L. Common Grape. Branches twining cylindric. Petioles subequal. Leaves cordate sinuate 3 or 5 lobed, acute, base cordate, teeth unequally acute, green on both sides. Racemes thyrsoidal paniculated. Flowers all fertile, pistil turbinate. Berries ellipsoid. Native of central Asia, cultivated all over the world. A multitude of varieties and names, perhaps as many as 500; the utmost confusion has been thrown on the subject by writers, and no general classification nor synonymy attempted. The same grapes are often found in France, Spain, Italy, Greece and Asia, under very different names. In this dilemma, I can only offer a first (and perhaps rude) attempt at distinction and co-ordination, and thus divide the principal varieties into 3 series, the last of which he will include 15 species or subspecies, so different from the others in many respects as to be probably peculiar species; nay, 3 of them, *V. labrusca*, *V. pinnata*, *V. laciniosa*, have been so considered by many botanists already.

I. Series. Berries oblong, elliptic, or suboboval.

Var. 1. *Precox*. Early Grape. Small leaves and branches, grapes small, loose, thick skin, juice insipid, pulp dry. Ripe in June and July.

Var. 2. *Burgundica*. Burgundy Grape. Leaves semi-5 lobed, red beneath, teeth subequal. Grapes black and sweet. 1. French. 2. Italian, larger and sweeter. 3. German, least sweet, austere.

Var. 3. *Edulis*. Chasselas Grape. Long petioles and lobes, teeth broad. Only good to eat. 3 subvarieties:

1. Yellow unequal berries. 2. Red. 3. White-green, musky.

Var. 4. *Moschata.* Muscat Grape. Leaves 5 lobed, with unequal segments and teeth, bunches long, grapes very sweet and musky. 6 subvarieties. 1. White. 2. Green. 3. Yellow. 4. Red, rounder grapes. 5. Small black. 6. Black Constantia. 7. Persian. 8. Syracuse red. 9. Gray. 10. Lachryma Christi, black.

Var. 5. *Zibiba.* Muscatel or Raisin Grape. Very large, musky delicious flavor, pulp firm. Sev. var. 1. White. 2. Green. 3. As large as Walnuts, from Mount Atlas. 4. Large white, from Syria. 5. Black, thick skin. 6. Red, from Greece. 7. Malaga white. 8. Sicily white. 9. Damson Grape, large purple like a Plumb.

Var. 6. *Malvesia.* Malmsey Grape. Leaves like Muscat, grape large, juicy, very sweet, not musky. 1. Madeira purple, hard skin. 2. Sicily, purple, smaller. 3. Yellow.

Var. 7. *Nigraria.* Claret Grape, with thick black skin, commonly a bloom on it, juicy pulp, not musky. Subvariety 1. Spanish. 2. Italian. 3. Calabrian. 4. Tripoli large. 5. Lombard or Canaan, with large bunches of 4 to 10 lb. weight. 6. Claret Grape, small, juice red like blood, taste harsh.

Var. 8. *Violacea.* Purple Grape. Skin commonly thick, austere, purplish, pulp firm not musky. 1. Violet color. 2. Light purple. 3. Spanish, a little juicy. 4. Small and harsh. 5. Smyrna, very large.

Var. 9. *Aurea.* Golden Grape. Leaves velvet-like above, not lobed, glaucous beneath, berries yellow oblong, perhaps a peculiar species. 1. Burgundy. 2. Spanish large. 3. Straw Grape, thick vinose juice, delicious perfume, makes the fine golden Straw Wine.

Var. 10. *Versicolor.* Varied Grape. Leaves variegated of red, yellow and green. 1. Grapes mixt of black and white. 2. White and red. 3. Yellow and green. 4. Aleppo black and white. Curious, but indifferent. Perhaps var. of *V. bicolor.*

Var. 11. *Greca.* Grecian Grape, glaucous or pale color, skin rather thick, very juicy, not musky, hardly sweet. 2. Blanquette of France. 2. Medoc. 3. Malaga. 4. Cyprus. 5. Grecian bluish white. 6. White Hamburg.

7. Teneriffe or Vidonia. 8. Madeira Vidonia, producing the strong dry Wine. 9. Bagoal of Madeira, sweeter. 10. Fayal. 11. Sicily Greca. 12. Sicily harsh. 13. Graves. 14. White bitterish. 15. Rhenish or Hock. 16. Lisbon. 17. Alpine acid.

Var. 12. *Perla.* Pearl Grape. Leaves 5 lobed, much cut up. Grapes oblong, hard, greenish. 1. Large Pearl. 2. Small Pearl 3. Sicily Perna. 4. White. 5. Straw color.

Var. 13. *Felina.* Cat's Grape. Small pale green, soft, juicy, disagreeable taste.

Var. 14. *Acetaria.* Verjuice Grape. Leaves ample, nearly round ; grapes ovate oblong, larger green, very acid.

Var. 15. *Dulcis.* Sweet-Water Grape. Commonly small, with a very thin skin, juice very thin and sweet, no pulp. 1. White. 2. Black. 3. Tokay, white, delicious flavor. 4. Blue Tokay, small brownish, with a blue bloom. 5. Cotnar of Moldavia, green, makes green wine. 6. Nectar of Greece, white styptic. 7. Persian.

Var. 16. *Cuprea.* Coppery Grape, of a brick or copper color. 1. Small sweet. 2. Large. 3. Hard and harsh.

II. Series. Berries nearly round, but yet diameter a little less than the length.

Var. 17. *Oporto.* Portugal Grape. Leaves large, with unequal lobes and deep teeth : grapes large black, with harsh red juice. 1. Common, leaves 4 or 5 lobed. 2. Short bunch, leaves 2 or 3 lobed. 3. Etna or Mascali. 4. Dalmatian. 5. Schiraz in Persia.

Var. 18. *Tinto.* Tinto Grape. Similar to Oporto, but with sweeter and blacker juice. 1. Spanish Tinto. 2. Tintilla. 3. Alicant. 4. Calabria. 5. Grecian.

Var. 19. *Tinctoria.* Coloring Grape. Leaves 5 lobed, deeply toothed, bunches unequal : grapes unequal hard, red, with black and austere juice. Only used to color other wines.

Var. 20. *Crassifolia.* Mansard Grapes. Leaves large and thick, with small teeth ; bunches long pyramidal, grapes large and black. 1. French. 2. Asiatic, bunches from 10 to 40lb. weight. 3. Grandifolia.

Var. 21. *Velutina.* Velvet Grape. Leaves trilobe, teeth very unequal ; grapes of a fine velvet black. 1. Cahors. 2. Italian.

Var. 22. *Syriaca.* Syrian Grape. Large, of a delicious flavor, juicy, red or black. 1. Damascus black. 2. Jerusalem, red musky. 3. Morillon, black early. 4. Morella of Italy. 5. Lisbon juicy, black. 6. Black Frontignac, musky, smaller. 7. Grisly, mixt of red, brown, and yellow.

Var. 23. *Malvagia.* Malvesy Grape. Similar to Malmsey, but rounder and musky, white or yellow. 1. Cyprus. 2. Sicily. 3. Yellow. 4. Mingrelia or prolific, bunches 10 to 30lb.

Var. 24. *Laxa.* Loose Grape. Petioles slender and gray, leaves hardly lobed, unequally sinuate: grapes large white, loose. 1. Gouais of France. 2. Persian.

Var. 25. *Prolifica.* Prolific Grape. Leaves thick, hardly lobed, sinuate: grapes black, not sweet, austere, middle size or small. 1. Common gamet. 2. Leaves trilobe smaller. 3. Grecian. Are great bearers, but make bad Wine, and spoil the good.

The above include all the chief varieties and subvarieties of what I consider as the original Wine Grape. I shall next enumerate 15 other kinds, commonly considered as varieties, but widely different in the leaves, &c. so as to afford permanent specific distinctions. I therefore propose them as species, or at least subspecies. Linnæus deemed also the *V. laciniosa* a peculiar species.

III. Series. Vines specifically different from the *V. vinifera.*

43. *V. labrusca*, Raf. Wild Grape. Branches trailing striated. Petioles subequal pilose. Leaves ample cordate, 3 or 5 lobed, whitish beneath, (white when young) smooth above, (hairy when young) lobes acute, coarsely serrated. Racemes compound, short and lax, flowers all fertile, petals pilose at the top. Berries globular, small, black and acid. Native of Italy, Greece, Sicily, Barbary, &c. the only wild Grape of Europe, deemed by some the original of all the cultivated Grapes, by others a degenerated kind: both opinions appear false, since it is known by history that the Wine Grape came from Asia, and that it does not change into *Labrusca.* The blossoms are fragrant as in our *V. riparia*, and the berries like the American Chicken Grapes, quite spherical, not eatable nor suitable for Wine.

44. *V. farinosa*, Raf. Mealy Grape. Leaves trilobe, lateral lobes bilobate, covered with a hoary powder, downy in youth. Racemes short compact. Berries oval. Var. 1. Black and large. 2. White and large. 3. White and small. Often called Miller's Grape, good to eat, makes bad Wine.

45. *V. cana*, Raf. Hoary Grape. Petioles thick and red. Leaves hardly 5 lobed, with large teeth, green above, white tomentose beneath. Berries round, yellowish, sweet. Var. 1. Common. 2. Rochelle, leaves 5 lobed, grapes round, white, sweet, subacid, thin skin. 3. Leaves trilobe whiter, yellow grapes.

46. *V. bicolor*, Raf. Black and white Grape. Petioles long. Leaves 5 lobed with double teeth, white tomentose beneath. Berries round soft, black and white on the same bunch. Is it a variety of *V. cana?* and is *V. vinifera versicolor* a variety of it?

47. *V. saccharina*, Raf. Sugar Grape. Leaves semi-5 lobed, villose and pale beneath, small subequal teeth. Racemes small conical subsessile. Berries round or oblong, very sweet. Var. 1. Pineau Grape. Oblong dense redish. 2. Griset Grape. Bunch deformed, grape round, gray, perfumed.

48. *V. rufa*, Raf. Mormain Grape. Leaves palmate, pale above, nerves rose color, villose whitish beneath. Berries round loose, rufous, sweet and fleshy.

49. *V. apiana*, Raf. Muscadel Grape. Petioles long. Leaves lobed laciniate, teeth acute, glaucous beneath. Berries round, white or rose. Var. 1. *Alba.* 2. *Rosea.* 3. *Parvifolia.*

50. *V. punctata*, Raf. Dotted Grape. Leaves hardly trilobe, deeply toothed, pale and smooth beneath. Racemes short. Berries oval acute, white dotted of yellow, very sweet. 1. Sauvignon small. 2. Puntillo, larger.

51. *V succinea.* Ambrette Grape. Leaves with acuminate lobes hardly toothed, smooth beneath. Berries oboval musky, transparent. Var. 1. Yellow. 2. Blackish.

52. *V. turbinata.* Ciotat Grape. Leaves 5 parted palmate laciniate, teeth elongate acute, smooth beneath. Berries oboval musky. Var. 1. *Alba.* 2. *Digitata.* 3. *Apifolia*, leaves cut like parsley, grapes red. 4. *Pyriform.* Pear Muscat.

53. *V. laciniosa*, L. Cutleaf Grape. Leaves digitate, 4 to 6 folioles subpinnatifid, unequal obtuse, pale and smooth beneath. Racemes simple oval pendulous. Berries rounded sweet and acid. Var. 1. White oval. 2. White round and small. 3. White and red. 4. *Grandifolia.* 5. *Dissecta.*

54. *V. pinnata*, Vahl. Branches smooth, round purplish. Leaves with 5 folioles, ovate petiolate serrate smooth, terminal lobe subsessile, lower ones often auriculate outside, pale and smooth beneath. Racemes twice compound, partial ombellulate. Grape not known. Genus doubtful, folioles 2 inches long.

55. *V. corinthiaca*, Raf. Currants Grape. Leaves large 5 lobed, lobes laciniate by long acute teeth, downy beneath. Berries small and round. Var. 1. White. 2. Red. 3. Transparent. 4. Sultana or Apyrena, without seeds. Native of Greece.

56. *V. maura*, Raf. Morocco Grape. Leaves subpalmate, teeth long acute, smooth beneath. Berries like a heart, unequal, large. Var. 1. Violaceous. 2. Tawny. 3. Very large purple. Native of North Africa, Morocco and Barbary.

57. *V. cylindrica*, Raf. Long Grape. Leaves ample, lobes and segments very unequal. Berries cylindrical, straight or curved, commonly acute, with hard pulp and two acute seeds. Var. 1. Olive Grape, oblong cylindrical greenish. 2. Long cylindrical, very hard. 3. Oblong, juicy, white. 4. *Incurva.* Curved yellow. 5. Curved oblong obtuse, green. 6. Curved, brick-red, acute. The French call this grape *Cornichon*, the Italians *Dattola* and *Oliva.* It is very good to eat, but rather insipid and not good for wine ; grapes one or two inches long.

Here ends the supposed varieties of *V. vinifera*, and begins the series of tropical Vines or *V. indica* of authors.

58. *V. indica* of Rheede, L. Malabar Grape. Leaves cordate without lobes, smooth beneath, teeth acute. Berries globular and red. In Malabar and India.

59. *V. flexuoso*, Thunberg. Japan Grape. Branches smooth in zigzag. Leaves cordate acute serrate, downy beneath. Flowers glomerate in long panicles. In Japan, called there Itodori.

60. *V. glomerata*, Raf. (*V. indica* of the West Indies.) Tropical Grape. Branches gray pubescent. Petioles long tomentose. Leaves oval acuminate, base reniform, denticulate, cinereous pubescent beneath, Racemes tomentose pedunculate glomerate long. Berries glomerate subsessile, globular and red. In Cuba, Hayti, &c. The grapes are of middle size, 3-4 seeded, edible.

61. *V. maritima*, Raf. Seaside Grape. Leaves cordate rounded, acute with small teeth, tomentose and white beneath, tendrils floriferous. Berries small globular red, rough, harsh, and acid. In Jamaica and Yucatan, on the sea side. Grapes not larger than currants and very much like them, not edible, and yet make a good Wine. The twigs, when cut, distil a cool water. Many other kinds of Vines appear to grow in tropical climates, perhaps different from these 4 last, and the grapes of Mexico, Brazil, Africa, Abyssinia, Persia, Thibet, China, &c. have never been described as yet. The 3 south African grapes of Thunberg, *V. pentaphylla*, *V. capensis*, and *V. cirrhosa*, are probably species of *Quinaria* or *Cissus*.

62. Another species, *V. heptaphylla*, L. is said by Smith to be merely the *Aralia sciodaphylla*, yet by Poiret's description it is a true *Vitis*, although it has the habit of *Quinaria*. It is a native of the East Indies. Leaves with 7 folioles (or 5 to 8) ovate entire, panicles branched, flowers verticillate. Calyx 5 toothed, 5 petals cohering at the top. 5 stamens, a sessile stigma as in *Vitis*.

III. *Section. Qualities and Properties of Grape Vines and Wines.*

Every part of these useful Vines is valuable and available. The countries where they are a staple, boast of being blessed above all others, and are envied by their neighbours. The ancient nations have cultivated them from the most remote antiquity, and ascribe their introduction to primitive legislators and benefactors. The Hindus, Persians, Armenians, Arabs, and Jews to Nahusha or Noah. The Greeks said that Bacchus carried them from Asia to Greece and India, Saturn to Crete, Orestes son of Deucalion, to Sicily, Osiris to Egypt, Janus to Italy, Geryon to Spain, &c. Their various uses

were known very early, and many Wines made at very early periods.

Vines live from 100 to 500 years, when allowed full scope, their roots and stems become very large, sometimes several feet in circumference. The bark is used for straps, ropes, baskets, mats, &c. The wood of the root and stem is very hard, and has a fine grain; it resembles Walnut and Cypress, is employed to make tables, doors, implements, &c. which are very durable; it is too valuable for burning when large. The branches and twigs are chiefly used for burning, and fagots made with them after trimming the Vines; much used in vine countries for ovens, to light fires and cook, &c. In the spring, the vernal sap of the Vines is similar to water, and very cooling.

The leaves are used for many purposes, to carry fruits, butter, and saleables to market, to cover, clean, scour, &c. Cattle are fond of them: they are given to cows, goats, and hogs. They form one of the best manures for the Vines themselves. A kind of Wine may be made of them with sugar.

The blossoms of the fragrant kinds are used as perfume, and to give this perfume to Wine, being put in when fermenting.

From the Grapes are made, 1. Verjuice. 2. Must. 3. Syrup. 4. Grape butter. 5. Sugar. 6. Wines. 7. Boiled Wines. 8. Nectar. 9. Piquette. 10. Lees. 11. Vinegar. 12. Brandy. 13. Alcohol. 14. Varnish. 15. Preserves. 16. Pies and Tarts. 17. Raisins. 18. Tartar or Argol. 19. Cordials. 20. Perfumes, &c. and they are one of the most palatable and healthy fruit of the table, of which there is a succession from the end of June to November: they may even be preserved fresh the whole winter in saw dust, and are thus exported.

The seeds of Grapes are eaten by fowls, pidgeons and birds; they are astringent and oily. A fine fixed oil is made from them by pressure in Parma, Lombardy, and other parts of Italy, similar to Olive oil, and used for burning and frying. The husks and peduncles are a valuable manure. When burnt, they make the best Potash used for soft soap. Argol or Tartar is extracted from the lees or settlings of Wine, and is incrusted in the

vats and casks : burned lees are called *Wine ashes.* From Argol are made tartaric acid and cream of tartar. Acetic acid is made from vinegar.

Verjuice is the juice of unripe Grapes and chiefly of the Verjuice Grapes, which never ripen. It is acid and harsh, containing malic acid, tartrate of potash, and extractive. It is used as a condiment like vinegar and lime juice. It is cooling and laxative : a peculiar Wine can be made with it by the addition of sugar, which resembles fine Cider or Champaigne, according to the mode of fermenting.

Ripe Grapes contain 1. Tartaric acid. 2. Sugar. 3. Water, and 4. Mucilage, in different proportion, according to the kinds : these are the essential elements of Wine before fermentation. The adventitious elements are : 1. Malic acid. 2. Carbonic acid. 3. Potash. 4. Tannin. 5. Aroma. 6. Coloring principle, which are not always present, except tannin, which is always found in the husk or skin, as well as the peduncles and seeds of the Grapes. Ripe Grapes are cooling, antiseptic, and nutritious : when eaten in large quantities, they become diuretic, laxative, and pectoral. They form an excellent diet in all inflammatory diseases, incipient phthisis, phlegmasis, convalescence from fevers, &c. The sweetest and well flavored kinds are the best, all the harsh and bad tasted are only fit to make Wine. It is with Grapes as with Apples, the best for the table do not always make the best Wine or Cider. Among American Grapes, out of 40 species, we have only 17 suitable to make good Wine, and among these only 8 very palatable, such as the Bland, Alexander, Scupernong, Muscadine, Elsinburg, Owisburg, River and Maple Grapes, with their varieties.

Raisins are the dried Grapes, which is commonly done by scalding the bunches in boiling water with ashes, which shrivels them, and next hanging them on strings to dry in the shade. A few are dried in the sun in very warm countries. These operations dissipate the water of the Grapes ; they diminish the acid and increase the sugar, which often crystallizes spontaneously in them. Raisins are less cooling than Grapes ; nay, eaten in quantity, they are heating and flatulent. Boiled Raisins

are almost restored to the primitive state of Grapes; they become very emolient, pectoral, and laxative. We could make raisins in America with most of the 8 kinds mentioned above as palatable, and also with some of the large Fox Grapes.

Many culinary preparations are made with fresh Grapes and Raisins, such as pies, tarts, plumb puddings, dumplings, preserves, jellies, &c. In America, we use for pies and tarts almost all the kinds except the bitter sort, and even the smallest Chicken and Pidgeon Grapes: they improve and enlarge by cooking. Grape Butter is made like Apple Butter, by boiling the Must or juice of the Grapes to the consistence of honey; it is much used in Europe and Asia, the French call it *Raisinet;* the best is made sweeter and granular by the addition of sugar, and is then one of the greatest delicacies. We could easily make it with our Grapes.

The unboiled and unfermented Must or recent juice is used as a pleasant and cooling beverage, with water and sugar, all over the Oriental countries; it is called *Sherbet*, and much liked by the Mahometans, who are forbid the use of wine; several kinds are made by the addition of raisins, cinnamon, rose water, spices and other ingredients; the best is cooled with snow. Syrup and sugar can be made from Must and raisins. The Must of sweet Grapes give a syrup by condensation or evaporation, which prevents fermentation; and raisins boiled to a pulp and strained give the same. This syrup has the flavor of the grape, and may be used like any other syrup. From it sugar is made by chemical operations, concentration, saturation, separation of water, granulation, &c. The Grape Sugar is peculiar, it never crystallizes perfectly, commonly forms lumps, and it is difficult to bleach it; but it makes very good and sweet coarse sugar. In Europe, the manufacture has been tried on a large scale, but chiefly in France, where the Grapes are not so saccharine as in Spain, and the preference has been given to the better and whiter home sugar of Beets and Chesnuts.

But WINE is the chief and most useful produce of the Grape. It is the juice of the Grape altered by the vinous fermentation. There are innumerable kinds of

Wines produced by the various Grapes, their mixture, climate and soil, cultivation and manipulation, care and skill. Perhaps 3000 kinds! of which 500 in France, 700 in Italy, 600 in Spain and Portugal, 100 in Germany and Hungary, 300 in Greece and Turkey, 100 in Persia, 200 in Thibet and China, 150 in Egypt and Barbary, 30 in South Africa, 50 in the Atlantic Islands, 60 in North America, 40 in South America. But several of these differ little from each other.

The chemical analysis of Wine gives, 1. Water. 2. Alcohol. 3. Sugar. 4. Carbonic, tartaric, and malic acids. 5. Tannin. 6. A coloring matter. 7. A volatile oil different in each Wine, and producing the bouquet or perfume distinguishing them. The predominance of these principles affords the best classification of Wines into 8 classes, red, white, sparkling, acid, astringent, strong, sweetened, exquisite Wines.

1. *Red Wines* owe their color to the coloring matter; they are the most common, often called table Wines or Clarets, they vary from pale purple to black, and from the thinness of water to the thickness of syrup. When new, or less than three months old, they are less agreeable, difficult to digest, flatulent, liable to irritate and inflame the bowels. When from 3 to 18 months old they are palatable and perfect. When older they become better still, lighter, milder, and healthier, very stomachic and reviving.

2. *White Wines* are made with white Grapes or red Grapes without husks, they are commonly limpid, thin and dry, whence often called Dry Wines or Sack. The color is white, pale, yellow or brownish. They are milder and less acid than the red Wines, very diuretic and useful in dropsies. Such are Hock, and Sherry.

3. *Sparkling Wines* contain an excess of carbonic acid. Commonly called Champaigne, white and frothy, very mild and healthy; but liable to affect nervous persons.

4. *Acid Wines* have too much malic acid; they are thin and sourish, but very cooling. The northern and mountainous countries afford hardly any other, the grapes being deficient there in sugar. Several American grapes

can produce no other unless sugar is added. The colors are white or pale red.

5. *Astringent Wines* contain more tannin, they are commonly red, rough and austere. Such are Port or Oporto, Catalonia, Roussillon, &c. Useful for persons of lax fibres, or who have undue evacuations; but liable to bring on gout.

6. *Strong Wines* have an excess of alcohol, which makes them affect the head; they are commonly white or brown. Such are Madeira, Teneriffe, Lisbon, &c. Unless drank very moderately, they produce intoxication, dyspepsia, inflammation, and chronic diseases.

7. *Sweet Wines* contain much sugar, some strength and perfume, they are commonly white or pale, but some are red also, commonly thick, luscious, delightful, acting as mild cordials, and very nourishing. Such are Cyprus, Malaga, Lachryma, Muscat, Malmsey, Constantia, &c. Used moderately, they are reviving, tonic, stimulant, and useful in all diseases of debility.

8. *Exquisite Wines* abound in delicious and fragrant aroma, are sweet, but not strong. Such are Tokay and Nectar, the best of all Wines or Cordials, the best kinds of which sell on the spot at $15 the bottle, or $60 the gallon, while common table wines often sell in Europe at 5 cents the gallon. The finest perfumed sweet Wines may be concentrated by frost into exquisite Essence of Wine.

Some of the most famous or valuable Wines are the following kinds: each has its peculiar flavor.

French Wines. 1. *Sillery*, amber color, dry, fine perfume, stomachic. 2. *Rose colored Champaigne*. 3. *Moselle*, white, light, agreeable. 4. *Straw Wine*, similar to Tokay, made with Grapes kept on straw till spring. 5. *Rangen*, white, very strong, bad for the nerves, may cause palsy. 6. *Pineau*, sweet, light, fragrant. 7. *Vouvray*, sweet, soft, strong, white. 8. *Grosnoir*, black, thick, rough, looses color and taste by age. 9. *Burgundy*, red, brisk, delicate. 10. *Coted'or*, red, strong brisk, high flavor. 11. *Auxerre*, red, fine, delicate, fine bouquet. 12. *Leclos*, white, quite limpid, fine. 13. *Chambertin*, red fine, sweet perfume. 14. *Volnay*, red, very fine, delightful smell. 15. *Grillet*, white brisk perfumed, sweet

when young, dry when old. 16. *Hermitage*, red fine perfumed. 17. *Golden Hermitage*, golden color, delicious perfume and flavor. 18. *Medoc*, or best perfumed Claret, 19. *Graves*, white Claret. 20. *Roussillon*, red, rough. 21. *Muscat*, white, sweet, delicious. 22. *Ciotat*, similar, but thin. Most of these best wines are drank as luxuries or medical tonics, and the very best are seldom exported, costing from 1 to $5 the bottle.

Spanish Wines. 1. *Tinto*, black, thick, strong. 2. *Tintillo*, ditto red. 3. *Seco*, white dry bitterish. 4. *Xeres*, or Sherry, white, dry, nutty, strong. 5. *Paxaret*, white sweet, high flavor. 6. *Grenada*, amber color, very sweet when young, losing the sweetness by age. 7. *Albaflora*, like Hock, white, not so dry. 8. *Sweet Malaga*, brown, sweet, strong, a fine cordial when old. 9. *Dry Malaga*, whiter, thinner and dry. 10. *Alicant*, red, strong, very tonic. 11. *Catalonia*, red and rough like Port. 12. *Malmsey*, sweet, redish, fine flavor. 13. *Red Malaga*, fine strong. 14 *Salamanca*, pale red fine.

Wines of Portugal are commonly called *Port* when red, and *Lisbon* when white: both are strong and rough, but improve by age, unless adulterated as usual with brandy. 1. *Carcavelos* is the sweet Lisbon. 2. *Bucellas*, the dry Lisbon. 3. *Setubal*, like Muscat. 4. *Minho*, best pale Port. 5. *Douro*, very rough.

Italian Wines. 1. *Chiaretto*, pale red fine. 2. *Pennino*, white, thin like water, acid, made in the Alps and Appennines. 3. *Florence* or *Tuscany*, similar to Burgundy, thinner, cannot keep. 4. *Lombard*, *Modena* and *Montserrat*, red thin acid. 5. *Montepulciano*, red, strong, hot. 6. *Vicentino*, red, strong. 7. *Falerno* and *Salerno*, red delicate. 8. *Calabrese*, black thick sweet. 9. *Tarento*, red, rough. 10. *Malvagia*, sweet, strong, delicate. 11. *Lacrima*, red, sweet, strong, perfumed. 12. *Moscatello*, yellow sweet luscious. 13. *Nobile* and *Vergine*, exquisite, similar to Tokay. 14. *Rosolio*, or *Fiascone*, white, sweet, thick, like a cordial. 15. *Paglino*, straw color, fine. 16. *Agrodolce*, sweet and acid, white. 17. *Venacio*, black and thick. 18. *Puglia*, pale red, brisk. 19. *Viterbo*, red and rough. 20. *Trappola*, sweet and bitter. 21. *Amaro*, red bitterish. 22. *Zafferano*, saffron color. 23. *Doro*, golden sweet. 24. *Albano* and *Sangui-*

nello, bright and pleasant. 25. *Greco*, yellow pungent sweet. 26. *Morello*, black strong. 27. *Vesuvio*, red strong. 28. *Ischia*, pale strong. 29. *Pergola*, pale, thin, flat. 30. *Passola*, fine, made with shrivelled grapes. 31. *Miele*, yellow, as sweet as honey. 32. *Corsican*, similar to Catalonia. 33. *Sardinian*, similar to Burgundy, many kinds. The Italian wines are hardly known out of Italy, being seldom exported; those of south Italy alone keep well.

Sicilian Wines. 1. *Di Pasto*, pale strong. 2. *Catania*, similar, with the pitch taste. 3. *Mascali*, red, strong. 4. *Etna*, white, firy. 5. *Palermo*, pale red, strong, but thin. 6. *Castelvetrano*, yellow, strong, limpid. The Marsala or Sicily Madeira is made with this Castelvetrano, brandy, bitter almonds, &c. well fined and kept two years. 7. *Tusa*, sweet brown, flavor of Cyprus. 8. *Siracusa*, sweet strong, yellow like Muscat. 9. *Noto* and *Lipari*, strong pale rough. 10. *Modica*, pale red, flavor of Malaga.

Swiss Wines. 1. *De Vaud*, dry like Rhenish. 2. *Neufchatel*, red, like Burgundy. 3. *Boudry*, red, good flavor. 4. *Montagnard*, thin and acid.

German Wines. Commonly dry and acid. 1. *Treves*, a specific for gravel. 2. *Hock*, white, very dry. 3. *Rhenish*, white delicate. 4. *Berg*, strong and perfumed. 5. *Heidelberg*, fine red. 6. *Bohemia*, like Burgundy. 7. *Danube*, delicate, do not keep. 8. *Austrian*, greenish, strong. 9. *Styrian*, pale strong. 10. *Spitz*, fine. 11. *Tyrol*, red, weak.

Hungarian Wines. 1. *Auspruck Tokay*, white, luscious, soft, mild, oily, exquisite. 2. *Marlas* and *Common Tokay*, inferior, thinner. 3. *Szeghi*, white, aromatic perfume. 4. *Moda*, nearly similar to Mazlas. 5. *Zombor*, strong, pale red. 6. *Matra* and *Arad*, red, sweet, strong wines.

Russian Wines. Only produced in the South. 1. *Zimlansk*, red, fine. 2. *Don*, white, fine. 3. *Tangarog*, disagreeable taste. 4. *Kaffa* or Champaigne of Crimea. 5. *Sudagh*, white, sweet, similar to Hungarian. 6. *Cutnar* or Moldavian, green, very strong.

Grecian Wines. 1. *Carlovitz*, red, fine brisk. 2. *Posega*, white, fine flavor. 3. *Dalmatian*, red, strong fine.

4. *Lissa*, dark red, very strong, the strongest of all wines. 5. *Morea*, red perfumed. 6. *Napoli* Malmsey. 7. *Malmsey* of Mount Ida in Candia. 8. *Nectar* of Candia, exquisite, delicate sweet. 9. *Samos*, sweet and acid white. 10. *Nectar* of Scio, sweet astringent. 11. *Scio*, pale red, fine. 12. *Tenedos*, like Medoc. 13. *Tenedos*, red Muscat. 14. *Santorin*, very sweet and agreeable, but sulphurous. 15. *Pitch wine*, brown, with the taste of tar. 16. *Holy wine*, very fine. 17. *Cyprus*, sweet perfumed, red when young, yellow when old, similar to Malaga, a fine cordial and stomachic.

Asiatic Wines. 1. *Smyrna*, red, strong, fine. 2. *Astracan*, red, similar to Lacrima. 3. *Caspian*, like Moselle. 4. *Caspian*, Champaigne. 5. *Kuma*, red light thin. 6. *Tartary*, strong, made very intoxicating by poppies. 7. *Tiflis*, fine wine made from wild grapes! 8. *Armenian*, red and white, fine strong. 9. *Syrian Claret*. 10. *Damascus*, golden dry. 11. *Lebanon*, thick perfumed red. 12. *Gold wine*, yellow, from Syria. 13. *Jerusalem*, white good. 14. *Sana* in Arabia, good. 15. *Shiraz*, red harsh, high flavor. 16. *Nectar of Shiraz*, white sweet, strong perfumed. 17. *Ispahan*, white fine. 18. *Tabriz*, red and white, many kinds. 19. *Shirvan*, red like best claret. 29. *Afgan*, similar. 21. Many wines in Bukaria, Thibet and China, hardly known.

African Wines. 1. *Jews wine*, red, good. 2. *Berber*, white, fine. 3. *Madeira* or *Vidonia*, dry, strong, yellow, flavor of bitter almonds. 4. *Bagoal* of Madeira, sweeter. 5. *Pingo*, Malmsey of Madeira, exquisite. 6. *Tinto* of Madeira, red, perfumed, austere, useful in dysentery. 7. *Canary*, white, similar to Lisbon. 8. *Vidonia* of Teneriffe, similar to Madeira when old. 9. *Gomer*, white, sharp, limpid as water, flavor of Madeira. 10. *Palma*, yellow, light dry. 11. *Palma Malmsey*, flavor of Pine apple. 12. *Fayal*, white, thin, strong. 13. *Azorian*, pale red, like light Port. 14. *Constantia*, red, highly perfumed, sweet. 15. *Cape* or *Henapop*, less perfumed. 16. *Stony*, dry like Graves. 17. *Rota*, red, strong. These 4 last from the Cape of Good Hope.

South American Wines. Only made in Chili, Cuyo, Tucuman, &c. little known, similar to Catalonia, pale red. In the Andes of Peru wine is also made, but weak

and bad tasted. The wine made in the West Indies with *V. glomerata* and *V. maritima*, is red, harsh acid.

North American Wines. Are made from Canada to Mexico, chiefly from native grapes. In the United States, 17 species can make good wine, either alone or with a little sugar. The principal wines already made are, 1. *Vincennes*, pale red, light. 2. *Vevay*, red, acid. 3. *Vevay prime*, brown and sweetish, fine. 3. *Alexander*, pale red, flavor of raspberries, and similar to best Burgundy, made with *V. prolifera*. 4. *Bland*, acid, strong, yellow, made with *V. blanda*. 5. *Lufborough*, red, rich, fine musky flavor. 6. *Catawba*, yellow, fine body and perfume. 7. *Scupernong*, yellow, limpid, very strong, firy when brandy is added. 8. *Muscadine*, yellow, sweet perfumed. 9. *Catskill*, strong, between Madeira and Port in taste and color. 10. *Coopers*, brown, similar to Lisbon, but acidule. 11. *Elsinburg*, fine flavor. 12. *Orwisburg*, very fine, white. 13. *Isabella*, pale and fine. 14. *Worthington*, similar to Port. 15. *Winter wine*, dark red, acid and harsh. 16. *York*, red, harsh. 17. *Harmony*, red, acid, good. 18. *Alabama*, brown, fine, &c. The European vines thrive in our gardens, and produce good eatable grapes with some care ; but are often injured in the fields by late frosts, and do not ripen well, or give a thin acid juice unsuitable for good wine : we must, therefore, rely on our native hardy grapes, some of which are equal to the best exotic.

The Mexican wines made from Spanish vines, produce wines similar to Spanish, but little known as yet.

Good wines have wonderful effects on the human system. Externally they are useful in frictions and lotions, in cases of local debility ; they may restore to life new born and very weak children, likely to die, by merely rubbing it on their stomach.

Internally they are good for suckling infants, troubled with worms, or with weak bowels, a teaspoon full is sufficient for them with milk or sugar. A popular vermifuge for children in Italy, is a mixture of wine, lime juice, olive oil, and sugar. Children, youths, and females ought to abstain from the daily use of it, and then it will be a cordial for them in almost all the diseases. The use of wine as a beverage ought to begin

only when the body is ripe, and always with moderation, avoiding all those adulterated by brandy or pernicious ingredients, as are Madeira, Port, and Sherry, which are never pure ; the best wines for daily use being the French wines, Clarets, Burgundy, Malaga, Lisbon, Fayal, Samos, Cyprus, besides our own American wines.

In old age good wines become more needful, they support strength and life. Plato called them the *milk of old age*. An old Italian proverb says, that *milk is the wine of youth, but wine the milk of old age*. Aged people can indulge with benefit in their daily use, but never to excess, and always with water in large proportion.

Temperance does not consist in abstaining from wine, but in using with moderation, and with water, none but the good and mild. The Temperance Societies lately established with us, have done a great deal of good in checking the vile habit of drinking spirituous liquors, but have done wrong in proscribing such wines : they ought merely to proscribe the vile trash called *Port* and *Madeira*, which are not *Wines*, but impure brandy mixtures or *Wine Grogs!* and encourage the importation and cultivation of mild healthy wines for substitutes. Christians and Jews can never abstain altogether from wine like the Mahometans, since it is needful in some of their religious rites.

When wines are drank in extra doses, they produce hilarity, and in excess intoxication. In both cases they quicken the pulse, stimulate all the organs, inflame the fluids, excite the mind, the nerves and head are more or less affected ; but this excitement is followed by drowsiness, head-ache, sleep, dejection, relaxation, stupor, diarrhœa, stupidity, or madness. All these effects are owing to the brandy or alcohol contained in the wines, thus they depend on their amount in each dose or glass, and on the habit of the drinker. Children may be intoxicated by a single small glass. Drunkards get gradually used to wines, and require more and more to affect them, thus losing for them altogether its medical effects. At last their bloated red face shows the appetite to have become a disease, *Oinomania*, or craving for wine, and they become liable to a multitude of chronic

diseases, gout, epilepsy, pleurisy, palsy, tremors, nervous diseases, liver complaints, dropsy of the chest, consumptions, inflammatory fevers, dyspepsia, madness, apoplexy, &c. and they entail them on their offspring!

This disease is rare in wine countries, not one in 500 becoming drunkards there, as they are despised and hooted; while in countries where wines are scarce, England, Sweden, Russia, and the United States, five at least in 100 become drunkards, and get beastly drunk on strong liquors and strong wines, rum, brandy, whiskey, Port and Madeira, without being despised as they ought, drunkenness being rather considered as a bad habit or infirmity, than a moral disease or shameful vice. The best cure for drunkenness are abstinence, mild and cooling drinks, bathing and emetics, besides moral restraint, religious feeling, and public opinion. *There would be no more drunkards if they were all despised and avoided by men and women! or put into hospitals as sick, insane, vicious, and criminal.*

The medical properties of good wines on temperate persons are numerous. They are useful in all atonic diseases arising from debility, in scrofula, scurvy, rachitis, paleness, leucorrhea, promoting digestion, stimulating the heart, increasing the heat of the body. They are the best vehicles for tonic medicines used in all fevers, debilities, prostrations, &c. Wine is to be forbid or avoided by those who have a nervous, irritable, or plethoric constitution, or some inflammatory diseases; but even then some acid wines, well watered, may be available and serviceable.

Several modifications of wine deserve to be known. *Must* is the pure unfermented juice. *Pure wine* is made of Must alone. *Impure* or *brewed wines* have ingredients added. *Colored wines* have a coloring matter added. *Mixed wine* is made with different grapes. It is *adulterated* when wines are united after fining. *Brandy* WINES are those adulterated by brandy, like Madeira and Port. *Moustille* is sharp and sweet wine still fermenting. BOILED WINE is reduced and thickened by boiling. *Piquette*, wine made by throwing water on the husks after pressure, it is like cider, and is drank without water by the labourers. *Protopion* wine made without pressure

by mere percolation of the grape, such is Tokay. *Deuterion* of the Greeks, is pressed, or rather wine made by mashing the grapes. *Nectar* is made by a slight pressure of the sweetest grapes. *Essence of wine* made by exposing wine to frost, throwing off the icicles, and thus concentrating the strength. It may be made as strong as brandy, without its pernicious quality, is very portable retains the perfume, and may be restored to wine by adding water. *Honey of wine*, congealed by age in 100 years to the state of honey, may be restored by warm water. *Solar wine*, exposed to the sun, made by it thicker, sweeter, and milder. *Crust of wine*, some thick wines, such as Arcadian or Morea, become hard and dry like salt or argol by age, may be dissolved again in warm water. The *Lees* or settlings of wine, are deposited by fermentation and fining, they are rich in argol and potash : from those of the best wines is made the *Oil of Wine*, by a very slow distillation with water. This oil which has the flavor and perfume of the peculiar wine it comes from, serves to give it to other wines, or to make false brandy with alcohol and water.

Quelled wine is such as was stopped in fermenting by throwing cold water in it, or exposure to cold weather. *Eager* or Pricked wine is becoming sour by the acetous fermentation having begun. *Flat wine* has lost its flavor by being exposed to the air or other means ; many poor wines become flat or sour by age ; they may be restored by chemical processes, lime, plaster, brandy, oil of wine, &c. *Burnt wine* is any wine made hot, but not boiled and drunk with spices, &c. useful for gout, cholics, and chills. Wine is often employed in cookery, for sauces, soups, ragouts, stews, puddings, and jellies ; it is always preferable to brandy and stronger liquids ; the ancients used to boil some fish in wine instead of water as a luxury.

Medicated wines are vehicles of various soluble medicines, chiefly tonics, emetics, and febrifuges. They are excellent preparations, although latterly some deluded physicians have preferred alcoholic tinctures, which are pernicious, unless used merely in drops. Wine tinctures are milder, more palatable, and quite as efficient. Those of iron, gentian, opium, colchicum, &c. are much

used. The Iron wine was known to the ancients ; it was made by putting rusty nails into it, or quenching in it nails made red hot : it is a powerful tonic and restorative. The Emetic wine is now made with tartar emetic dissolved into wine : it is one of the most certain and less disagreeable emetics. Every febrifuge medicament ought to be given in mild wine, as it increases the effect.

Vinegar is the result of acetic fermentation ; the best is made with sour wine, both red and white. Any bad wine unfit to drink becomes vinegar by itself after a while. When wanted quick, it must be put into a barrel washed with boiling water. Vinegar is used as a condiment in sallads and many dishes : to make pickles, sauces, syrup, distilled vinegar, acetic acid, medicated vinegars, perfumed vinegars, &c. It is highly medical, antiseptic, refrigerant, analeptic, &c. The external use of it is very useful in fevers, head aches, syncope, asphyxia, hysteric and nervous affections. From it are made the vinegar of squills, colchicum, opium, camphor, &c. Vinegar can be discolored and made as clear as water, by filtration over animal charcoal or burnt bones: and it is then a good vehicle for perfumes, scented waters and washes used by ladies. The ancient Romans drank vinegar and water. A kind of lemonade may be made with it and sugar. The syrup of vinegar is very refreshing in summer. Pickles are only good when the substances pickled are healthy, thus boiled beets, carrots, onions, tomatos, &c. make good pickles, while pickled cucumbers, walnuts, cayenne pepper, &c. are very bad and unhealthy.

Brandy is distilled wine, consisting of alcohol, water, and the peculiar oil of wine. It contains over one half of alcohol. Wines produce more or less brandy, according to their strength, many weak French wines produce only one-fifth. The quality of the brandy depends on the wine, and the mode of distilling it. When new it is as clear as water, but gets a coloring in the oak casks : it is also colored by burnt sugar, and thus is always impure. By age it loses its firy taste, and becomes mellow or milder. It is always unhealthy, even drank moderately and with water, but perhaps less so than rum and whiskey. It speedily produces the worst kind of

intoxication and the disease of intemperance. It acts on the stomach and brain as a pernicious stimulant and corrosive. It is, however, used medically in sudden chills of the stomach by gout or cold water; but warm wine has exactly the same effect. Externally it is often employed in bruises, contusions, wounds, sprains, as a stimulant and resolvent. A peculiar kind called aniseed brandy, (*Zambu* in Sicily) is made in Italy with wine and aniseeds, which makes water milky. Brandy is called oil proof when lighter than olive oil, a drop sinking in it. To know how much oil proof brandy any wine will give, boil slowly a measure of it, as soon as the vapour rises set fire to it, and when the blaze subsides, take it from the fire and measure it again; the deficiency will be the brandy contained in the wine. A very pernicious custom consists in adding brandy to weak wines; brandy thus added never amalgamates well, decomposes the wine by a slow process, and changes the wine into bad grog! Whenever strength is required in wine, the brandy must be put in the Must before fermentation, by which it is incorporated and modified; the alcohol of wine is always so chemically combined as to be harmless. Fruits preserved in brandy are very unhealthy.

The only proper use of brandy is to make alcohol by a second distillation: this of course can only be done in wine countries, where wine is worth 5 cents the gallon, and brandy 20 cents, when alcohol comes to 50 cents only. Alcohol being the principle of all fermented liquors, and a chemical alteration of their sugar, is produced by cider, beer, rum, arrack, rice, and barley malts, at a rate nearly as cheap. Alcohol is a violent poison taken in any quantity, it burns and corrodes the stomach like aqua fortis; but externally it is a good stimulant and strengthening tonic. It is, however, much used in medicine and the arts, being a powerful solvent of many substances, resins, oils, &c. With it are made medical tinctures, elixirs, sweet scented essences, lotions, varnishes, cordials, &c. Used also to preserve animals for museums; but it has the defect to destroy their colors. It ought to be much diluted when for internal use. It is saturated with sugar to make cordials, and thus rendered

milder and luscious ; but yet the alcoholic cordials are pernicious, even in small doses, and pure good wines are by far better for all the purposes of cordials. The best use of alcohol is for economical fuel to heat and cook in tin vessels.

Wine and water is, after all, the best of all beverages, and the most healthy, when mild wines alone are used. Wines of good body are those that bear a great deal of water without losing their flavor. All white wines bear water sparingly, and some are spoiled by it, such as Madeira, Graves and Hock, while Clarets are improved by it, and bear from 3 to 5 parts of water to one of wine. Some thick and strong wines bear 15 or 20 parts of water. The strongest of all wines, such as *Lissa* and *Cutnar*, give 40 per cent of alcohol, or 80 per cent of brandy. The strong wines, such as Port, Madeira, Marsala, Sherry, Lisbon, &c. hold from 40 to 60 per cent of brandy. The mild wines from 20 to 40 only: the mildest (and thus the best) is Tokay, which has only 27 brandy, or 10 per cent alcohol, no more than cider! The quantity of brandy afforded by mild wines is thus the measure of their healthiness and body. Clarets have 30 to 36. Burgundy 30 to 32. Hock 27 to 30. Champaigne 25 to 27. Muscat 22 to 25, &c. The milder they are the less water they bear, and *vice versa.*

Section IV. *Principles of the cultivation of Grape Vines, and chiefly in North America.*

1. It is not my intention to give an elaborate treatise on the cultivation of vines all over the world, but rather practical hints on the management in the United States of our own kinds.

2. Vines being cultivated in all parts of the world, in different climates and soils, require different management, are often not kept alike, even in the same countries, and thrive under several modes of cultivation.

3. In general, temperate climates (from which they are mostly native) are the best for them : the boreal and tropical climates are not suitable for them, as the excess of cold or heat either chills or burns them.

4. In Europe, vines are cultivated for wine every where, except in England, Netherlands, Denmark, Swe-

den, Prussia, Poland, and Russia, and even there are found in gardens producing grapes for the table; but their juice has not sugar enough to make tolerable wine.

5. In North America, the wild vines grow as far as Canada, in lat. 45, and from thence to the Gulf of Mexico; how far south they extend in Mexico is not known. Wherever found wild, wine can be made. In Europe, the wine limits extend from lat. 48 to 50 N. and south to Africa.

6. In France alone, the vineyards occupy five millions of acres, (besides the garden grapes) which produce yearly about 1000 millions of gallons of wine, besides the grapes eaten, thus averaging 200 gallons per acre. The wines sell from 7 cents to $4 the gallon wholesale, according to quality. France having 32 millions of inhabitants, this produce gives 20 gallons for beverage to each, and 360 millions for exportation or making brandy, vinegar, &c.

7. In Italy and the Islands, with a population of 24 millions, nearly as much wine is made, and as many acres cultivated; thus giving a much larger average to each individual, since less is exported or made into brandy. The price varies from 4 cents to $5 the gallon.

8. In Spain and Portugal the amount is less, much brandy and raisins being manufactured and wines exported. In Germany and Greece but little is made in proportion; and in all Mahometan countries, except Persia, where wine is less proscribed, none but the Greeks, Armenians, and Jews make wine and drink it; but grapes are much cultivated for the table, preserves, raisins, &c.

9. In North America wine was very early made from our native grapes, by the French in Illinois. Our native tribes drank the juice or must of the grapes, but were unacquainted with the art of making wine. Small trials were made in the English colonies and United States at several periods; but all the trials directed towards the imported vines have failed, owing to our climate being unfavourable to them, while it is very favorable of course to our native grapes.

10. The European and African grapes succeed pretty well in our sheltered gardens, and thus will give us good

fruit for the table; but when planted in exposed vineyards, the late frosts and heavy showers of the spring injure them or render them sterile.

11. A capital mistake was the attempt to make Madeira wine in America, instead of American wine. Our climate and soil being neither dry nor volcanic as in Madeira, could never produce similar wine, even if we had the *Vidonia* or Madeira Grape, and knew how to cultivate it and manage the wine. Besides Madeira, although a fashionable and costly wine, is bad, unhealthy, and not worthy of our attention. The same with Port wine.

12. These and other causes have discouraged the attempts of a vine company established on purpose in Pennsylvania. Mr. Legoux, the manager, by his deceptions in grapes, calling them by false names, and his bad management, threw discredit on the attempt. However, by calling our Bland and Alexander grapes, *Madeira* and *Cape*, he was instrumental in diffusing them among those who would not have noticed nor bought them if known as native vines.

13. Notwithstanding these difficulties, many patriotic individuals have persisted in the endeavor to make the United States a wine country, by establishing nurseries and vineyards. Such were Major Adlum, of Georgetown, and Mr. Dufour, of Vevay, who have also both published works on the cultivation of vines. Mr. Samuel Maurick, of South Carolina (the first exporter of our cotton in 1784) who established a large vineyard at Pendleton. Mr. Thomas Echelberger, of York, Penn. who has been instrumental in establishing 20 vineyards near York.

14. In 1825 I collected an account of our principal vineyards and nurseries of vines. They were then only 60 of 1 to 20 acres each, altogether 600 acres. While now, in 1830, they amount to 200 of 3 to 40 acres, or nearly 5000 acres of vineyards. Thus having increased tenfold within 5 years, at which rate they promise to become a permanent and increasing cultivation.

15. Wishing to preserve the names of the public benefactors who had in 1825 established our first vineyards,

I herewith insert their names. They are independent of the vineyards of York, Vevay, and Vincennes.

In New York, George Gibbs, Swift, Prince, Lansing, Loubat, &c.

In Pennsylvania, Carr, James, Potter, J. Webb, Legoux, Echelberger, E. Bonsall, Stoys, Lemoine, Rapp.

In Delaware, Broome, J. Gibbs, &c.

In Maryland, Adlum, W. Bernie, C. Varle, R. Sinclair, W. Miles, &c.

In Virginia, Lockhart, Zane, R. Weir, Noel, J. Browne, J. Duling, &c.

In Carolina, Habersham, Noisette, &c.

In Georgia, Maurick, James Gardiner, S. Grimes, Checteau, M'Call.

In New Jersey, Cooper at Camden. Another at Mount Holly.

In Ohio, Gen. Harrison, Longworth, Dufour, &c.

In Indiana, Rapp of Harmony, the French of Vincennes.

In Alabama, Dr. S. Brown, and at Eagleville.

16. The average crop of wine with us is 300 gallons per acre. At York, where 2700 vines are put on one acre, each vine has often produced a quart of wine, and thus 675 gallons per acre, value $675 in 1823, besides $200 for 5000 cuttings. One acre of vineyard did then let for $200 or 300, thus value of the acre about $5000! This was in poor soil unfit for wheat, and for mere Claret.

17. Now in 1830, that common French Claret often sells only at 50 cents the gallon, the income must be less. I hope our claret may in time be sold for 25 cents the gallon, and table grapes at one cent the lb. and even then an acre of vineyard will give an income of $75, and be worth $1000 the acre.

18. The greatest check to this cultivation is the time required for grapes to bear well, from 3 to 6 years: our farmers wishing to have quick yearly crops; but then when a vineyard is set and in bearing, it will last forever, the vines themselves lasting from 60 to 100 years, and are easily re-placed as they decay.

19. The next check is the precarious crops if badly managed. Every year is not equally plentiful, and some-

times there is a total failure when rains drown the blossoms; but an extra good crop of 500 or 600 gallons commonly follows and covers their loss.

20. The cultivation of the vines includes several considerations, a choice of ground, soil, and vines, repairing the ground, planting, manuring, dressing, trimming, grafting, harvesting, besides the diseases of the vines and grapes.

21. Vines may grow any where, but do not thrive equally every where. Table grapes thrive best in sheltered gardens, espaliers, and bowers, producing more and better fruit. Wine grapes thrive best of all on the eastern slope of hills exposed to the rising sun, and in a volcanic or gravelly soil, producing stronger and better wine.

22. All our native grapes will grow well near to their native soil, and produce different wines. Some species are peculiar to the Southern States, and will not thrive so well north of the Potomac and Ohio rivers. They grow spontaneously in rich soils, or loam, sand, gravel, rocks, near streams: in fact every where, but seldom in clay and mountains.

23. The best situations for native vineyards are sheltered valleys, banks of streams, on the eastern and southern sides of hills in the Northern States; but further South plains and open grounds will do as well. If they have a wood to the north west or south west to shelter them from the cold blasts or sudden storms, so much the better. In the north they may also require such shelter from the north east storms.

24. These are the best soils for them in the order of excellence. 1. Volcanic, scarce with us. 2. Pseudovolcanic, of New York and Connecticut. 3. Granitic, rotten rocks. 4. Sandstone gravel. 5. Gravel and sand. 6. Barren and worn out soils. 7. Rich or loamy soils are the worst, except clay and damp or cold soils, which always produce bad wine. Pine barrens will do.

25. Thus it is seen that the worst soils for all other agricultural purposes are the best for vines. Many millions of acres of our rocky, gravelly, or barren soils, now hardly worth any thing, may thus, if turned to vine-

yards, give $50 at least neat yearly income, becoming worth $500 or more an acre, at a small expense of a few years. A single million of acres of vines might produce yearly 200 millions of gallons of wine, worth $50,000,000 at only 25 cents, and affording from 10 to 20 gallons yearly to each individual for beverage.

26. In the choice of vines, select those that grow best near you or bear the best fruit. If you find in the woods any vine bearing plenty of good grapes, mark it, and cut it up into cuttings in the winter for your use. It is essential with our wild grapes to see them in fruit, in order to ascertain if they are worth cultivation, and that the mother vine is a fruitful one, there being many sterile with us.

27. If we raise our vines from seeds, we are never sure to have the same kind, a variety will often spring up: besides half of those thus raised are sterile or male vines with us, which does not happen with the exotic grapes. Moreover, a seedling vine (unless grafted) will not bear fruit till 10 or 15 years old, while cuttings bear in 3 to 5 years. Therefore seeds ought never to be sown except for experiments.

28. Whether for gardens or vineyards, let us select none but the best kinds of exotic or American vines. The ample account given of them may serve to guide the choice. The very best of our vines being *V. blanda*, *V. prolifera*, *V. muscadina*, *V. ciliata*, *V. dimidiata*, *V. labruscoides*, *V. longifolia*, *V. acerifolia*, &c.

29. All vines may be cultivated alike, and bear very different treatment. When allowed to grow over trees, or on the sides of a house, or in bowers, without much trimming they last several centuries! and a single stock may produce 150lbs. of grapes, giving 10 gallons of wine.

30. The very best mode would be to cultivate the vines together with mulberry trees, as in Italy, allowing them to mingle and hang in festoons. This saves the great expenses of poles for support, and afford silk and wine on the same spot. One acre produces as much in this way as if it was a solitary vineyard.

31. Our American grapes are impatient of control, and thrive best when left to climb aloft without much

trimming. When kept under as usual in vineyards by annual cutting, they only last from 40 to 60 years, and thus less than the European vines.

32. The best foreign grapes ought to be raised in sheltered gardens for table fruit. Even the most delicate may be naturalized gradually, by sowing the seeds, and sowing a second or third time the best seeds produced in the country. This, however effectual, is a very long process, which requires patriotism and patience.

33. To prepare the ground for vines or a vineyard, a crop of potatoes or turnips ought to be raised on it before planting, which improves and opens the ground, or else it ought to be manured and ploughed deep several times in the fall previous.

34. The best manure for vines then, and at any other times, are composts made to suit the soil, or mixtures of good earth, ashes, gravel, sand, iron dregs, rubbish, brick dust, oyster shells, vine leaves, and grape husks, with a little dung. If the ground is rich of itself, it requires more ashes, sand, and other loosening manure. If poor, more earth and dung.

35. But the very best manure for vines are volcanic ashes, which might be imported on purpose in ballast, from Naples, Sicily, Portugal, the Canary or Azore Islands. *Puzzolana* above all, which is a kind of it, useful also for water cement. These ashes might highly improve our wine. Next to them are crumbling iron stone and granite ; also the gravel dregs of forges, or the powdered dross. The residue of the grapes, after mashing them for wine, the lees of the wine itself, and even the decayed leaves of the vines are also excellent manures.

36. A regular vineyard ought to be in rows, if to be worked with a plough ; but in Europe, where the hoe is more commonly used, they often plant the vines checker wise. The hoe is better than the plough, because more vines can be planted on one acre, the whole ground is kept better open, and the produce is greater ; but with us the plough is preferred as cheaper.

37. The rows from 5 to 10 feet apart, and each vine from 2 to 5 apart: thus allowing from 1200 to 3000 vines on one acre. The more on the acre the greater the expenses at first, but also the greater the produce after-

wards. Each good vine ought to bear from 30 to 60 clusters of grapes, weighing from 5 to 15lbs.

38. The rows must run north and south, so as to have the full advantage of the rising and setting sun, or else from north east to south west, so as to be better sheltered from those winds which with us bring sudden rains and storms, while the first protect the others from the bleak vernal north west wind.

39. When rows and vines are crowded, nothing can grow besides in the vineyards; but 3000 vines in one acre, if only producing 5lbs. each, may give 1000 gallons of wine. While, when kept remote, many crops can be raised in the intervals, such as potatoes, turnips, beans, &c. It is a prejudice to think this injurious to the vines: it is not so, provided the crops are such as require previous ploughing and do not shade the vines.

40. But different grapes must not be planted promiscuously, so as to prevent the mixture of blossoms, pollen, and change of fruit. Each kind ought to be kept separate, and even divided by fence, walls, hedges, or meadows, forming a vineyard by itself.

41. Plant the cuttings in pits or a trench one or two feet deep, made with the hoe or plough, and filled with good manured earth or rich made soil with some rubbish, gravel, or ashes at the bottom, below the cuttings.

42. The time of planting is from October to May: the best months are November and March. If you plant in the fall, cover each plant with a little hillock, and uncover it in the spring. If the weather be dry after planting, water them.

43. Choose your cuttings from good vines, and strong shoots of last years growth, from 16 to 24 inches long, with 5 or 6 buds. Let them be cut smooth below at a joint and slanting one inch above the upper bud; the slope must be opposite to the bud, that no bleeding of the sap may follow it.

44. If the cuttings are to be kept over winter, or sent to any distance, keep them in sand or dry earth, or else in moss or straw. They must be kept dry, moisture is pernicious, and frost still worse.

45. Put the cuttings in the loose ground of the pit or trench, at the chosen distance, in a slanting way, bend-

ing the bottom of it and pressing the earth close to it with the foot. Put the whole in except the upper bud, which is to become the shoot, all the others, 4 or 5, are to become roots. Sometimes 2 buds may be left out.

46. Keep the ground very clean and free of weeds at all times, but above all the first years, by working it often with the plough or hoe, or by pulling the weeds. At the end of the first year, cover each vine with a hillock in November, and uncover it the next spring.

47. *Second year.* Begin to preserve the vine either by rubbing the buds or cutting weak shoots, leaving only 2 or 3 strong buds or shoots. Put in the stakes or poles on which they are to climb. Plough or hoe the ground and clear the weeds.

48. *Third year.* Rub off the lower buds and prune the side shoots. Put on cross poles if meant to be used. Plough, hoe, and weed. Many vines will begin to bear grapes this year,

49. The fourth year ought to be the first crop, a full bearing beginning at 5 or 6 years old. The annual pruning and trimming must then depend on the mode adopted for cultivation.

50. It is well to rub off in the spring all the buds except such as are meant to bear, in the summer to cut off all superfluous or weak shoots without blossoms, and in the fall to make cuttings for planting, selling, or burning of all shoots grown too long. But it must be remembered, that too much pruning weakens the vine as much as extra foliage and extra bearing.

51. Trim the vines to suit the chosen method, leading, bending, and fastening them over the poles, cross poles, treillisses, trees, bowers, side walls, &c. of the vineyard or garden. The poles or stakes must be of durable wood, oak, chesnut, locust, or cedar with us ; but need not be large nor thick. Thin split ones will do for cross bars. Even canes and split canes will do well, and are commonly used in south Europe as cheap and light: the large ones being used for standing stakes.

52. The grapes commonly grow on the spring shoots, and these on the last year shoots : it is therefore needful to spare these in pruning. All dangling branches must be raised ; when trees are the support, they may

be led from one to the other, still less pruning is required with trees for support.

53. In warm countries, vines must be left well shaded by the leaves. In a cold climate or a cold season, it is usual to cut many leaves so as to expose the grapes to the sun to ripen well. Leaves, shoots, and grapes must never be pulled, but cut with the sickle, knife, or nail.

54. In a dry climate, a circular hollow ought to be dug at the foot of the vine, so as to allow rain to collect there, while in a wet climate or season, the reverse is needful, and a small hillock must be raised around it.

55. When the vineyard is in full bearing, a single ploughing or hoeing is required, very early in the spring. Manuring is only required once in 3 or 5 years, similar to what has been mentioned already; the whole ground need not be manured, but merely the foot of each vine in the winter. Dung compost, in small quantity, is very good.

56. Grafting is needful upon bad or sterile vines or seedlings, &c. It must be performed in March, with good scions and cuttings by cleft, grafting and binding with clay: also by approach in a pot. Good grafts ought to bear fruit the same year. In gardens, a variety of grapes may thus be procured. Our wild vines are excellent hardy supports for all exotic grapes, which thus become less liable to early motions of the sap.

57. The crop or harvest of grapes is called vintage. It is always a season of festivity. Although grapes may be produced for eating from July to November, the vintage is always in September, when most are ripe. The clusters are cut with a knife, and carried in baskets to the vat or press.

58. Many diseases attack the vines in Europe, and several insects prey on them. Our own vines are seldom liable to them, and have fewer insects than any other fruit. The worst diseases are the blight and the yellows.

59. The blight or mildew may affect the leaves, blossoms, and fruits. It is always caused by drops of rain of a shower on which a hot sun shines, which burns them by acting as a lens. The leaves and fruits become covered with shrivelled brown spots. There is hardly any

remedy for this, but the diseased leaves and fruit ought to be cut off.

60. Another kind of blight happens in the critical time of the vines being in blossom, if a heavy shower then falls, the pollen or farina is drowned, and cannot fertilize the fruit buds. This sometimes spoils the whole crop. If we could shelter the vines from our south west vernal storms by buildings, walls, woods, or a thick foliage, this would seldom happen. Never work the vines when in blossom.

61. The yellows are caused by the root becoming weak by bad food or overbearing. The leaves then become sickly and yellow. This is more easily cured by removing the leaves, pruning the shoots, cutting some clusters, but above all by manuring, removing the earth from around the root, and re-placing it with good compost.

62. Some small caterpillars group under the leaves, curl and eat them. They must be destroyed by cutting the leaves attacked, and crushing the insects under foot. Bugs and other insects feeding on the vines are not dangerous. No Aphis is found on our vines, and no insects destroy the roots nor the grapes.

63. Depredations on the grapes when ripe is a great evil, but as this happens only for a short while, it must be guarded against by watching the vineyards night and day as soon as the grapes begin to get ripe. Rural watchmen are paid on purpose in Europe. Dogs will not do, because they are fond of the grape. Foxes and birds are also depredators. Vineyards ought not to be near roads, or easily accessible, on that account.

64. Let us conclude by giving a pro forma account of the expense of forming and keeping up a vineyard, calculating all charges as cash to be paid, although most farmers may own the land, and give their own labor, or procure their own cuttings and props, which will be so much less.

One acre of land, from - - -	$1 to 10
Preparing the same and manure, - -	5 to 10
1000 to 3000 cuttings, if bought, - -	5 to 30
Planting them, - - - - -	5 to 20
Expenses of first year, - -	$16 to 70

Brought forward, - - - -	$16 to 70
Second year, poles, canes, &c. - -	5 to 10
Cultivation, pruning, &c. - - -	5 to 8
Third year, cultivation, &c. - -	5 to 8
Fourth year, cultivation, manure, &c.	5 to 8
Total, - -	$36 to 104

65. This shows the lowest and highest cost, the medium may be $40 or 50 per acre. On the fourth year the income may cover this whole cost, if it is only 150 gallons of wine at 50 cents; $25 being deducted for casks and making the wine.

66. On the fifth and succeeding years, the annual expenses will be only from $10 to 30, or $5 to 10 for cultivation, pruning, manure, and the remainder for making and keeping the wine, while the income will be from $100 to 200, for 2 to 400 gallons of wine at 50 cents, or half if only sold at 25 cents. Thus, at the lowest, leaving a yearly clear income of $40 to 100, or as much yearly for ever as was spent at first to plant the vineyard! The land will be worth from $500 to 1000 the acre! and may let at $25 to $50 to tenants. Thus upon an average, each vine is worth half a dollar, and any one who plants 100,000 vines, acquires a fortune of $50,000, or a clear yearly income of $2000 or more!

Section V. *General principles of Vinification, or the art of making Wine.*

1. I do not mean to give the numberless modes of making all kinds of wines; but rather the general principles of the art, with their application to American wines.

2. Whatever wines we make here, can never be Burgundy, nor Champaigne, nor Hock, nor Port, nor Lisbon, nor Tinto, nor Madeira, nor Malaga, and so forth; but American Wines. It is idle, it is silly, it is needless, and it is a deceit to attempt it, or to give them foreign names.

3. But we may make, nay, we have already made, several very good American wines, quite peculiar to us; and we may imitate several foreign wines, such as Claret,

Burgundy, Oporto, Malmsey, Carcavelos, and many more. Let us be honest and give them as such, with pompous American names if we like.

4. Wines can be made with almost all juicy fruits, although the real wines are the produce of the grapes. Thus, currants, gooseberries, elder berries, huckle-berries, persimons, black-berries, oranges, peaches, pears, apples, pine apples, &c. have all been used to make peculiar wines. Those of apples and pears are called Cider and Perry. Each other kind ought to have also a peculiar name, because they all differ somewhat from wine.

5. These fruit or domestic wines will only be mentioned slightly. The wine of currants or *Ribesium*, is the most important for us, because it is already often made, is nearest to the best grape wines, and can be made to any amount with profit. Several kinds are made, which are very good when not spoiled by the addition of brandy, which makes them firy and pernicious.

6. Currant wine or *Ribesium*, always requires water and sugar, because currants contain malic acid and no tartaric acid. But it requires no brandy nor whiskey. To make it more like wine, some good wine, with a little quicklime and argol, may be put into it before fermentation.

7. Mr. Dyers' currant yard near Providence, Rhode Island, may be mentioned as an example worthy of imitation. This yard contains 40 acres; each acre has 1400 currant bushes, and produces yearly 120 to 150 bushels of fruit, which, with water and 4000lbs. of sugar, make about 1600 gallons of wine from each acre, selling at 75 cents and one dollar per gallon. Thus each acre producing $1200, or $800, deducting the cost of sugar, casks, cultivation, &c. as I was informed.

8. At this rate, the whole yard would give 64,000 gallons of wine, and an income of $32,000! if all made into wine and sold. Mr. Dyers makes two kinds of wine, *Groseille*, or *Red Ribesium*, and *Malmsey*, or *White Ribesium*. He uses no brandy nor strong liquors. Both are excellent, and equal to many fine foreign wines. He exports much of it to the West Indies. Is not this a profitable industry?

9. Wine making is a chemical operation, in which a due proportion of needful elements is essentially requisite. No liquor is a wine unless it has undergone the real vinous fermentation.

10. The needful elements of fermentation are, 1. Sugar. 2. Water. 3. Tartaric acid. 4. Mucilage. The adventitious elements, which may or may not exist, are tannin, potash, carbonic and malic acids, arome, coloring principle, &c.

11. The Must is the liquor produced by grapes. A perfect Must ought to have a due proportion of the four elements of wine. When deficient in any, it ought to be supplied, if we want to make good wine. If any element is in excess, it ought to be corrected.

12. The due proportion of sugar or sweet principle, is 3lb. in one gallon of Must. When less, the Must makes a very dry or weak wine, when more, a very sweet wine. The sugar is changed by fermentation into alcohol, chemically combined in the wine, and only evolved as a vapor by fire or the process of distilling. In all sweet wines, a portion of the sugar is not decomposed, still more involving and weakening the alcohol.

13. The due proportion of tartaric acid and mucilage does not exceed 5 per cent. of each. The excess of tartaric acid makes the wine sour or acid. When deficient, or supplied by malic acid, the wine is deficient in body and strength. Malic acid changes wine into cider liquors; grapes have little malic acid, whence best to make wine.

14. Currants, gooseberries, blackberries, apples, &c. containing too much malic acid, and no tartaric acid, can never make but bad and sharp cider wines by themselves; but by the addition of quicklime, the acid is absorbed and corrected, the tartaric acid may be supplied; water dilutes the juice, and sugar strengthens it, whereby imitation wines are made.

15. When mucilage is deficient, no due fermentation can take place. The substitution of yeast spoils the wine, and gives to it the flatness of beer. Mucilage is rather to be supplied by dissolved gum, in case of need. An excess of mucilage produces only a greater quantity

of lees. Wine hardly retains any mucilage when clear; it ought to be precipitated in the process of fermentation and clarification along with tartar and potash.

16. Tannin, or the astringent principle, is communicated to wine by the peduncles, husks, and seeds, whence rough wines are made, such as Port. Delicate wines ought to have no perceptible astringency or roughness, and the seeds ought not to be bruised in mashing the grapes, nor allowed to fall in the Must, nor the husks neither.

17. The arome, or peculiar taste and smell of wines, also called flavor and bouquet, is produced by a fixed oil, different in almost every kind of grape and wine. A peculiar grateful flavor and scent enhances the value of wine many fold, (witness Tokay) and all excellent wines ought to have this quality.

18. To preserve the arome of wines, it is needful to stop the fermentation before the natural end of it; and to procure it to deficient grapes, some peculiar flavored substance must be immersed in the Must while fermenting. In this depends the art or secret of making valuable wines, worth from $1 to 5 a gallon, instead of 5 to 25 cents. Each celebrated vineyard has a peculiar secret process. Time and experience alone can teach us this secret art to its full extent.

19. Yet we know the substances employed ; they are oil of best grapes, vine blossoms, *Reseda*, or Mignonette, cowslip blossoms or *Primula*, elder blossoms, violets, oris root or *Iris florentina*, raspberries, strawberries, &c. In Cyprus, they are Smilax blossoms. In Xeres, Madeira, and Marsala, bitter almonds are employed. These substances are suspended in the casks in bags, while fermentation is proceeding.

20. Our best native grapes give to our wines a peculiar grateful flavor similar to raspberries. Our fox grapes, with a musky or foxy taste, impart to their wine a Muscatel flavor, somewhat similar to Constantia. Our fine scented vine blossoms, even when dried, give a rich grateful flavor and scent to our wines. To currant wine, which is made when the vines are in bloom, these fresh blossoms may give a flavor near to Tokay wine.

21. The coloring principle is immaterial to wines. There are wines of all colors, clear as water, white, yellow, green, hyacinth, red, brown, black, &c. These colors do not impart any value to wine; although the finest and dearest wines are commonly pale, yet Constantia and Lachryma, &c. are red.

22. Some wines lose their color or change it by age. Any wine can be made colorless, or clear as water by infiltration through animal charcoal or ivory black. It may be colored afterwards to any shade of yellow by burnt sugar, and any shade of red by cochineal or Brazil wood. The red Champaigne is colored by elderberries juice, boiled with tartar, a few drops are sufficient to color a bottle of wine. Some kind of grapes are used to color pale wines.

23. Therefore, the essential operations to correct a bad Must, or to make a good Must and wine, are to obviate any deficiency in the juice of the grapes or other fruits, by supplying the due proportion of sugar, tartaric acid, mucilage, and water that may be lacking, besides destroying or absorbing the malic acid, avoiding the mixture of tannin, and procuring a grateful aroma.

24. The art of wine making includes, besides this fundamental knowledge, many practical operations, such as gathering the grapes, carrying them, extracting the juice, mending it, fermenting the liquor, fining and clarifying, preserving the wine, obviating the defects and diseases. It is even a part of this art how to drink the different wines.

25. Carbonic acid is always evolved in the act of fermentation, and escapes with some alcohol by evaporation. When restrained and prevented from escaping, it produces the brisk and sparkling wines. When fermentation is allowed to take its course, all the carbonic acid disappears.

26. Grapes ought to be gathered in the day time and a dry fair day. For the best wines, none but the sound clusters are to be used; for the very best, the sound grapes ought to be separated from the peduncles, which are to be thrown away. Grapes are to be carried to the vats or presses in baskets, without being crowded and bruised. If dirty, they ought to be washed.

27. The thin skin grapes require peculiar care in handling. Our native grapes have all a thick skin, and require little care. Tokay and some other delicate wines, are made with grapes so soft as to drop their juice by their mere weight. All wines thus made without mashing, were called *Protopion* by the ancient Greeks; they are the very best.

28. Must and wine are made not only with ripe grapes, but also with unripe ones, also shrivelled or over ripe ones from the vines, grapes kept on straw, scalded or half dried grapes, nay, even with raisins and vine leaves. Very different wines are thus made.

29. Green and unripe grapes make dry light wines, similar to Champaigne, Hock, Rhenish, Moselle, and Graves. Their elements are similar to currants and gooseberries, composed of pure acid and extract, but deficient in sugar, which must be added, else their Must is nothing but verjuice. All our acid wild grapes, sour even when ripe, have a similar juice, and may make a red dry wine with sugar.

30. The due proportion is 40lbs. of fruit to 5 gallons of water, added by degrees while mashing. Then add 30lbs. of sugar, half a pound of crude tartar, the whole should make 10 gallons of Must at least. Keep 12 hours, strain, put in a tub or vat, cover with a blanket and boards, keep two days, put next in casks with a vent hole and peg. Decant in December, fine it several times, and bottle in March. If too sweet, ferment again before fining by exposure to air and heat upon the lees.

31. All grapes shrivelled or over ripe make good strong wines often sweet. Some grapes thus used, produce very valuable wines, but the quantity is always less. They never require addition of sugar. Raisin wine is seldom made, although many good sweet wines can be made with them. Raisins must be scalded, pressed, and the juice treated as common Must.

32. The wine of vine leaves and tendrils is altogether artificial: it is brisk like Champaigne. The process is to infuse 100lbs. of leaves and tendrils for 24 hours in 16 gallons of water, poured boiling hot over them. Press them twice very hard, add to the juice 50lbs. of sugar, and water sufficient to make up 20 gallons of Must.

Then ferment it as above for green grape wine. If a sweet wine is desired, more sugar is required, and the fermentation must be stopped by racking in sulphured casks.

33. There are many ways to procure the juice of ripe grapes. Mashing is the most ancient, and as yet, the most usual. This is done for common and cheap wines by trampling the grapes under naked feet over the boards of the vats, where they are heaped, by walking and dancing over them. Although this antique process appears not very clean, yet it is not more unclean than kneading the bread dough with the hands, and besides the fermentat on purifies the juice completely.

34. But for the best or valuable wines, the grapes are mashed by rollers in a trough, or a peculiar press with a circular trough. Juicy grapes are very easily mashed ; the hard or tough grapes even require but little pressure, and nothing like apples for cider. Our fox grapes with tough pulp, require rather to be left standing after bruising or mashing, so as to allow the pulp to dissolve, before the juice is extracted.

35. In no case are the seeds to be bruised, else the wine will be rough and harsh : thus any hard pressure that might mash the seeds and husks is to be avoided. When the seeds fall in the vats, and are allowed to remain there during the fermentation, they impart an austere taste to the wine. It is therefore essential to avoid seeds, husks, and peduncles, in making delicate wines, unless we wish to imitate Port wine. This may be done by straining.

36. Commonly fifteen pounds of grapes ought to afford one gallon of Must, and 5 gallons of Must ought to give 4 gallons of wine, after fermenting, settling, and fining. But juicy grapes give more, and tough grapes less, thus from 12 to 18lbs. of grapes may give a gallon of Must.

37. A deficient Must may be mended by the rules already stated. It is then that sugar, water, brandy, lime, scented substances, &c. may be introduced to advantage before fermentation, so as to incorporate well, which can never be done after it.

38. Sugar is not the leaven of wine, as often erroneously supposed, but the parent of strength and alcohol,

into which it is changed by fermentation. Therefore, adding sugar to the Must, if not sweet enough, is equal to giving strength to it, and is by far preferable to adding brandy then or afterwards.

39. Sugar is seldom added to weak wines in Europe, because it is too dear: while brandy is added because it is cheap. We may easily avoid this error in America, where the reverse happens. In Spain, they often add the brandy to the Must, this makes Sherry tolerable. In Port, Madeira, &c. the brandy is added after fermentation, and thus they become WINE GROGS!

40. Any other spirituous liquors added to the Must or wine besides brandy, spoils the wine completely; rum and whiskey, above all, give a very bad burning taste. Peach brandy is used for our Scupernong wine, which spoils it also and makes it firy.

41. In many countries, a part of the Must is boiled to condense the sugar of it, and then added to the whole to strengthen the wine. This is a very old and very good practice; but since sugar is now in general use, and so cheap, it is hardly needful. When the whole Must is boiled, very sweet wines are produced.

42. To know the strength of the Must, which varies every year, let it be weighed with the hydrometer or any other means. A good Must ought to weigh at least one tenth more than water, or 1.100 up to 1.140 when water weighs 1.000. Or if a gallon of water weighs 8lbs. a gallon of good Must ought to weigh 9lbs.: the more the weight the better, and greater the strength. Whenever an egg floats in the Must, the weight is 1.125. Our wild grapes give a Must of 1.040 to 1.100 weight, the Muscadine or Scupernong is only 1.040.

43. By a simple yearly trial, we may thus know the state of our Must, and how much sugar is required to give it a proper strength. This will vary from 4 to 20 ounces per gallon, in order to produce strong excellent wines. Many of our grapes, however, can produce good thin clarets without sugar, like common French and Italian wines; but if superior wines are wanted, sugar becomes needful. Every 4 ounces of sugar per gallon increases the weight of Must 11 in 1.000, or above 1 per cent.

44. Water is seldom wanted to dilute the Must, unless to make Piquette, or a very thin poor wine, in quantity rather than quality. Coarse sugar is the best to sweeten the Must, because it contains mucilage. Syrup will do as well; but molasses will not do, unless deprived of their bad taste by charcoal. Honey gives a flat taste to wine. Our maple sugar will do very well, and also the fresh syrup or molasses of maple.

45. Mucilage is the leaven of wine; it separates by fermentation into lees that sink, and froth or yeast that rises. Whenever mucilage remains in the wine, it is liable to ferment again even in bottles, therefore, the whole must be separated by racking and fining. If a second fermentation is needed, it may be produced by putting any wine over lees, and mixing them by rolling the casks.

46. Yeast of beer must never be used for any wine, not even currant wine; it gives a bitter taste of hops, an ammoniacal flavor and flatness. A wine leaven, useful for all artificial wines, may be prepared by drying the lees and froth of wine: it may be kept long for use.

47. So true are these principles, that sugar and vegetable mucilage or extract may form wine alone with water, but tartar adds to the strength and helps the fermentation by promoting the change of sugar into alcohol. But such artificial wine would be tasteless unless flavored by fruits.

48. Sweet wines are the best of all wines, because the whole sugar has not been converted into alcohol, either by a deficiency of mucilage or by the fermentation being suspended before the end of it: which may be done at any time by decanting or separating the liquor from the lees and froth, then straining or filtering, clarifying and sulphuring.

49. Whenever tartar must be added, crude tartar is the best, because it contains some mucilage of the grapes. Cream of tartar is not so good, although it is said to promote the briskness or sparkling property.

50. Quicklime is the ingredient commonly used to correct the acidity of some grapes: but if not used sparingly it gives a bad urinous taste to wine. In Spain, they only sprinkle the grapes with it. In France, they

put one gallon of slacked lime for 100 gallons of wine. Pidgeon dung, being almost pure lime, is often used for the same purpose. It is often collected and sold for this purpose in Europe. If not sparingly used, the urinous taste is still worse in the wine. Ground plaster is also used.

51. Turpentine, tar, firwood, &c. cover the acidity of wine, but impart to it the tarry taste. This is the great defect of common Grecian wines; but the Greeks do not dislike that taste. Our spruce twigs would give to our wines the taste of spruce beer.

52. The best heat for fermentation is variable. It merely begins at 54 degrees F. and is very slow till 60 degrees: from this up to 100 degrees it improves; the greater the heat in the vintage time, the quicker and the more violent is the fermentation, and the wine is commonly the better for it. The froth of fermentation, when allowed to escape, makes the wine sweeter, when kept in the wine, drier.

53. Fermentation ought to be carried on under sheds, in the open air, and in close vessels, with bungs, spile holes, pegs, or safety valves. The larger the casks the sooner it is completed, whence the usual use of vats or large tuns and tubs, holding 1000 gallons or more. Light brisk wines, like Burgundy and Champaigne, are allowed to remain only for a few hours, (from 6 to 24) in the vats. White wine only 36 hours. Red wine from 2 to 5 days.

54. Wines removed from the vat to casks after straining through the hair sieve, will continue in a slow state of fermentation, depositing lees and throwing froth. If the froth is removed repeatedly, or the wine often changed from cask to cask, it will ultimately cease. The casks are kept in cellars, wells, or cool stores.

55. The choice of casks is not useless. Old casks are always preferred. New casks, unless burnt, communicate a taste and color to wine, therefore, the inside ought always to be charred; the best casks are made of oak or chesnut staves; the larger they are the better, for the sake of uniformity in the wine.

56. Each change of casks leaving the lees behind, is called a racking, the best wines require several, and

thus a set of casks on purpose. Sulphuring is the operation by which a cask or the wine is impregnated with sulphuric acid, whereby the mucilage is precipitated and the fermentation stopped. The black oxide of manganese has the same properties.

57. A sulphuring liquor may be made by the action of sulphuric acid on saw dust, the fumes being conveyed to the wine, and some of the dust liquid thrown in it. However, the most usual mode is to fumigate the empty cask, before racking, by burning sulphur matches in them.

58. Another mode has lately been found to destroy fermentation in wine or other liquors, or even to prevent it altogether. It is the use of *Sulphite of Potash* (not the sulphate) diluted in them. A single ounce weight of it will do for 600 or 800 gallons.

59. Fining or clarifying the wine is the next operation, and always needful before bottling. Many substances are employed, sand, gypsum, fishglue or isinglass, salt, gum, starch, rice, milk, charcoal, albumen or white of eggs, ox blood, &c. They all act in the same way, by precipitating the tartar, acid, and every remain of mucilage : whereby the turbid wine becomes perfectly clear and transparent.

60. The use of these substances is optional, the cheapest being most frequently used. They must be dissolved in wine before mixing, and are all precipitated themselves. The proportion required depends on the foulness of the wine : they may be added by degrees. Eggs and milk are the best. The ox blood and salt give a bad taste to delicate wines. Isinglass may destroy the aroma, if not sparingly used.

61. The acid fermentation of wine, whereby they are changed into vinegar, takes place when there is too much water in it, when the vinous fermentation has been imperfect in weak wines, or when the leaven predominates over the sugar. Vinegar may even be produced by mixing brandy and milk, or by passing the compound carbonic acid gas of the vinous fermentation through water and mucilage.

62. No acetic fermentation can take place as long as there is a portion of undecomposed sugar in the wine ;

whence the need of stopping fermentation before it is quite decomposed. Sweet wines never change into vinegar. Sugar put into light and dry wines prevents the acetic fermentation; but if put in after it has begun, it increases it. Charcoal, plaster, and lime must then be used to absorb the acid. Brandy is of no use then.

63. The fretting of the wines in the spring after vintage, is a second slow fermentation. It is the best time then to bottle brisk wines, to give flavor to insipid wines by immersions of odorous substances, and to clear the whole mucilage by fining, else the wine may fret and become pungent.

64. Sherry wines are made by sprinkling the grapes with brandy and wine, some brandy is put in the Must; several rackings, at one month's interval, with some brandy added each time. This is the least objectionable mode of making strong wines, yet the brandy is not totally incorporated. In Vidonia, Sercial, Madeira, Teneriffe, Port, Fayal, &c. the same precautions are seldom used, and the brandy put in is only diluted: whence their unhealthy and pernicious use. Brandy can only be put in strong wines to make them still stronger: because it decomposes and destroys all the delicate fine wines like Claret, Burgundy, Champaigne, Hock, &c.

65. The mixture of wines can be subject to no rules, as it may be varied in numberless ways. Many wines are only used for mixing and improving (or spoiling) others. Some dark wines serve to color the pale clarets. The Catalonia is made into Port, with brandy and logwood. Nay, it is said that much Port is drank in England, which has no wine at all in it! Madeira is made with Teneriffe, brandy, and Prussic acid! Thus drunkards are gratified and poisoned.

66. The only proper mixtures of wine ought to improve them. This may be done by adding some good wine, or some essence of wine, or oil of wine, to wines of inferior quality. The essence of pure excellent wines, concentrated by frost, is the most valuable addition to any kind. The art of mixing wines and grapes is the practical secret of vineyards.

67. All poor wines, whether thin or brisk, do not keep long, and ought to be drank new. The best wines are

those that keep well, and are improved by age and a sea voyage : they are commonly sweet and rich. These best wines must be drank alone, in small glasses, like cordials. Good table wines ought to bear from 3 to 6 times their bulk of water, to be improved by it, and always drank with it.

68. Delicate and superior wines ought to be bottled as soon as perfectly clear and 6 to 9 months old, particularly if to be transported. Common wines ought to be kept or sent in barrels or quarter casks. Large casks are only useful at the vineyards. Some wines improve by travelling, and are better than on the spot ; this they owe to the shaking and time elapsed.

69. Mustiness, harshness, acidity, and ropiness are the four principal diseases of wines. When wines acquire a musty or bad taste, they may be restored by charcoal and toasted bread put in gradually. To mend harsh wines, put in it gradually milk, salt, and sand. If too acid, sugar, lime, or ground gypsum, or add sweet wine to it. Lead formerly used, is a poison, and must never be employed, as it makes the wines deleterious, producing cholics, &c. When wines get ropy, they must be fined or clarified again.

70. To recapitulate. Wine is as easy to make as cider, notwithstanding such needful cares. Very little additional trouble will produce superior wines, of double value at least. The same grapes may produce several kinds, white or red, sweet or dry, rough or sparkling, according to the mode of fermenting. Sugar must be used to strengthen the wines, and never brandy. It is worth while to attend to the quality rather than the quantity. Time and experience will teach us still better the practical details.

THE END.

ADDITIONS TO THIS MANUAL.

1. Bruce, in his travels, mentions that a small black and sweet Grape is wild all over Tigreh in Abyssinia.

2. The red coloring matter of the skins of black Grapes is soluble in alcohol, it crystallizes and is a peculiar substance *Vitine*, near to Hematine.

3. Inferior Brandy is often made with the lees of Wine.

4. The carbonic acid gas produced by fermentation is dangerous if breathed, and may asphyxiate.

5. The substances used to colorate Wines are black grapes, elder berries, mulberries, poke berries, privet berries, Brazil wood, &c. Poke gives a bad taste.

6. A new process has been invented in France to ferment Wines in close vessels, with caps and refrigerants like stills, in order to keep in the aroma and make better Wines.

7. A piece of Ice put in the Wine in casks prevents acidity in summer.

8. Wine acquiring the taste of wood by being put in new casks not charred, may be restored by shifting into old casks over good lees, with a little sweet oil added; oil is also good for mustiness and bad taste of all Wines.

9. Cream of tartar put in boiled Wine, and thrown in the casks, corrects the ropiness and fatness of Wines.

10. Vine leaves are much liked by cattle and horses: their taste is acid acerb, owing to the surtartrate of potash and other salts. They were formerly used for diarrhea and in chronic catarrh.

11. The sugar of potato starch is extensively used now in France to ameliorate Wines, and is found the best of all sugars for that purpose.

12. This sugar is very easily made by boiling one part of starch in four parts of water, with a little sulphuric acid, saturation of the acid by lime water, and clarification, evaporation, &c. as usual.